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MANUAL OF OPERATION

HAWK 4000

DATATRAP



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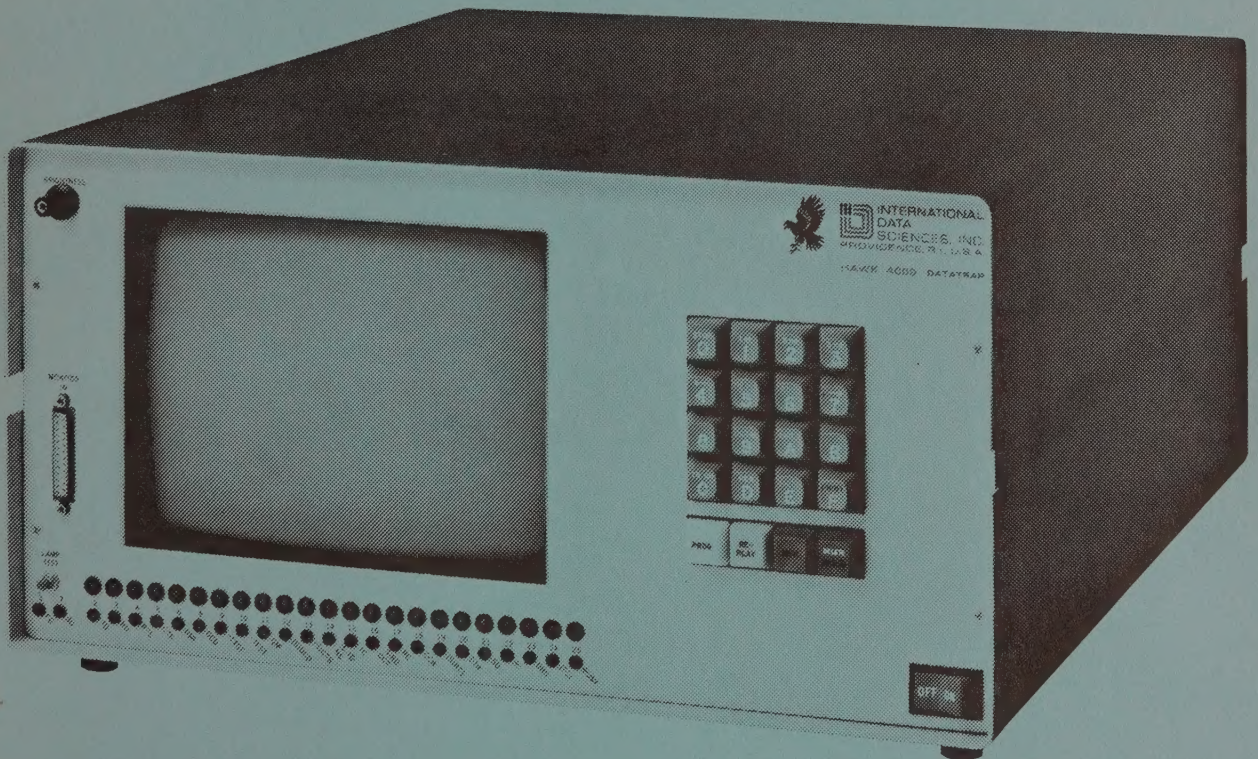


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MANUAL OF OPERATION

HAWK 4000

DATATRAP



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1.0 INTRODUCTION AND GENERAL DESCRIPTION

The Hawk 4000 Datatrap is an interactive data communications test set designed to monitor, generate, and receive data at the modem-terminal interface. The Hawk displays all data traffic at the EIA modem-terminal interface on an easily read 9", 512 character CRT screen. Front and rear panel photographs of the Hawk 4000 are shown in Figures 1.0-1 and 1.0-2, respectively. Data can be monitored on-line, or the Hawk 4000 can communicate interactively with modems, terminals, and host computers.

The Hawk 4000 quickly locates and isolates problems in the hardware and software of data networks by simultaneously displaying both transmitted and received data. The operator can program the Hawk to trap and store 4096 characters and recall this data for further detailed visual analysis. Thus problems caused by transmission errors, equipment malfunctions, or inherent software faults can be efficiently analyzed and corrected.

The Hawk 4000 may be connected in-line to monitor or communicate interactively with modems, terminals, or host computers. Equally, the Hawk 4000 may be bridged on-line to monitor the modem-terminal interface. When in the monitor mode, the Hawk can operate with asynchronous, BSC, and synchronous protocol line modes. When in the interactive modes, the system can operate with asynchronous and BSC line protocols. Note that the Hawk 4000 can only interact with either the terminal or the modem at any one time even though both may remain plugged into the unit.

A 16-key (hexadecimal) keyboard and a row of four command keys control all functions of the Hawk 4000. Other front panel instrumentation includes: a row of 25 test jacks that provide individual access to each EIA signal conductor; 23 LEDs that monitor EIA signal activity; a Lamp Test pushbutton that checks all LEDs; a 25-pin EIA connector, labeled Monitor IN, used to bridge the data link for passive monitoring; a Brightness control knob; and a Power-On switch.

1.1 Technical Specifications

Speeds - Asynchronous: 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200, 9600, 19,200. Synchronous up to 19,200 bps as determined by modem clock.

Character Format - Synchronous: 5, 6, 7, or 8 bits with 1 or 2 synchronizing characters. Asynchronous: Will receive characters with 1, 1.42, 1.5, or 2 stop bits; Transmits characters with 2 stop bits; Odd, even or no parity.

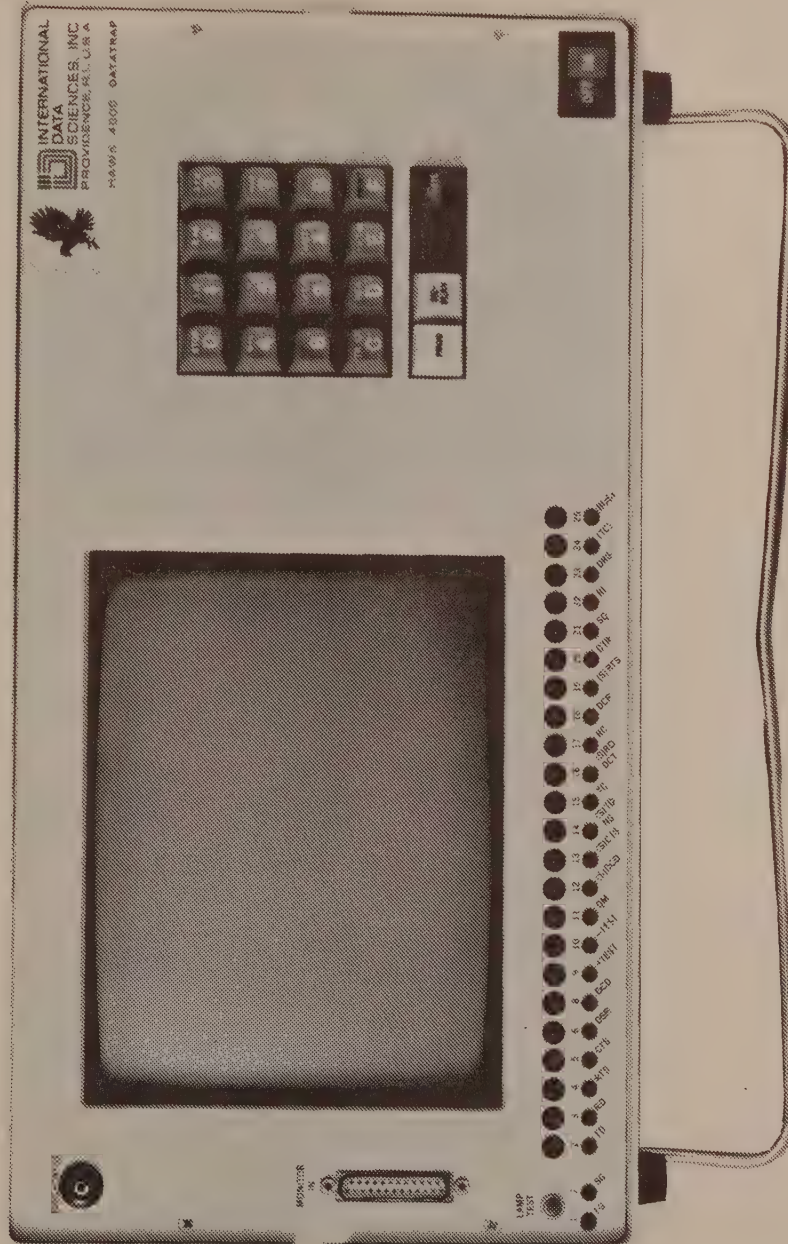


FIGURE 1.0-1. HAWK 4000 FRONT PANEL PHOTOGRAPH



FIGURE 1.0-2. HAWK 4000 REAR PANEL PHOTOGRAPH

1.1 Technical Specifications (continued)

Protocols - BISYNC, SDLC, HDLC, X.25, and ADCCP standard.

Codes - Octal, EBCD, Field, Transcode, Baudot, Selectric, Hex, ASCII, and EBCDIC standard.

Display Modes - Full Screen, Split Screen, Row Interleaved, and EIA Control Pair.

Event Markers - 12 events providing negative image markers include: parity error, framing error, arrival of a preselected character, occurrence of a sync event, RTS, CTS, DSR, DCD, DTR, SQ, RI, and BUSY.

Event Counters - Each of the four event counters accumulate up to 999 occurrences of the 12 programmed event markers displayed on the CRT with a negative image overrange indication.

Multiple Character Trap - The Hawk will search for and trap on a character string up to 127 characters long on either TD or RD, or can be programmed to trap on two different character strings, one on TD and the other on RD. "Don't Care" characters (Hex '00') may be imbedded anywhere within the string.

Interval Timer - Measures programmable event intervals from 0.0 milliseconds to 999.9999 seconds between two events. Any one of the trapping events can be used to start and/or stop the counter.

Idle Deletion - All Idle characters may be deleted from the data stream.

Data Inversion - Level inversion for MIL-188 compatibility.

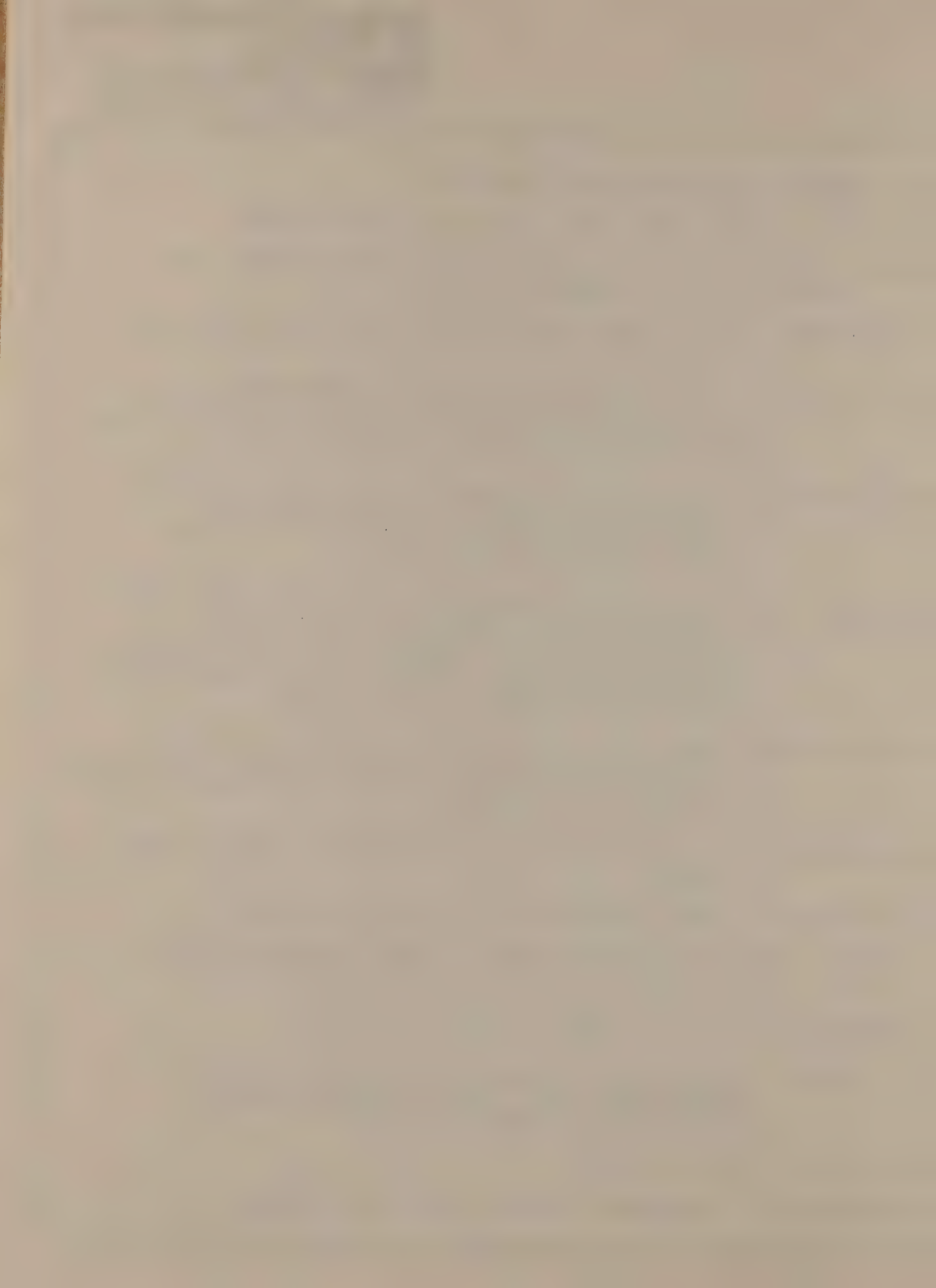
Interface - 23 LEDs monitor all EIA Interface conductors except Display - frame ground on pin 1 and signal ground on pin 7.

Interface Test Jacks - All 25 EIA Interface signal conductors.

CRT Display - 9-inch, 512 character locations on 16 lines of 32 characters each. Two menu pages contain instrument configuration status.

Buffer Size - 4096 characters.

Program Entry - Hexadecimal keyboard plus four command keys.



1.1 Technical Specifications (continued)

External Controls - CRT Brightness control knob.

Interface - EIA RS-232C and MIL-188C compatibility are standard.

Size - 8 3/4" (22.23 cm)H x 19" (48.26 cm)W x 21 1/4" (53.98 cm)D.

Weight - Approximately 49 lbs. (22.23 kg)

Power - 115 VAC, 60 Hz.

Temperature Range - 0° to 50°C.

Printer Interface - 36-pin rear panel connector interfaces the Datatrap with both serial and parallel TTL, 20 mA current loop (60 mA optional) and EIA printers such as DEC printer and Teletype. Depressing the "Print" push-button on the Hex keyboard enables a printout of the CRT display.

OPTIONS

Rack Mount - Allows unit to be rack mounted in a standard 19-inch cabinet.

Power - 230 VAC, 50 Hz operation.

2.0 INSTALLATION

Installation of the Hawk 4000 depends on the options being used and the specific application or intended use. This section provides information to satisfy general mechanical and electrical installation requirements.

2.1 Installation Planning

The Hawk 4000 should be installed within six (6) feet of a grounded AC outlet capable of furnishing 115 volts AC, 60 Hz, 140 watts. The distance from the Hawk 4000 to the data terminal or modem should not exceed the length of the cable supplied. (The Hawk 4000 is supplied with one 6-foot, male-female EIA cable for connection to data terminal or data communication equipment).

As the Hawk 4000 is transportable, a suitable position must be located for temporary installation. The Hawk 4000 should be placed so that it stands directly on all four feet with nothing beneath it to block the bottom air intake holes. A minimum of six (6) inches is required at the rear for cable clearance and air flow.

2.2 Unpacking and Inspection

Before unpacking the Hawk 4000, inspect the packing container for unusual damage. Then unpack the Hawk 4000 and thoroughly check the unit for external damage. If physical damage is present, retain the packaging material and contact the carrier immediately. Each unit has been thoroughly inspected both mechanically and electrically prior to shipping.

2.3 Removal of Internal Packing Material

Before the Hawk 4000 can be used or installed in a rack, the internal packing material used to protect the CRT and circuit boards during shipping must be removed and discarded. Removal of the internal packing material is effected as follows:

- A. Remove the top cover plate by removing and retaining three screws from each side of the unit.
- B. Lift and remove the top cover from the unit, placing it on a clear adjacent area.
- C. Remove the two (2) pieces of internal packing material located (a) behind the CRT and (b) above the printed circuit board rack.

2.3 Removal of Internal Packing Material (continued)

- D. Make sure that all circuit boards are firmly seated.
- E. Replace the top cover.
- F. Replace the six screws (three 8-32 x 5/16" screws per side).

2.4 Mechanical Installation

The Hawk 4000 is a free-standing unit equipped with plastic feet and a metal bale. Using the bale, the Hawk 4000 may be tilted upwards making the controls more accessible when the unit is used as a desk-top monitor. The rack mount kit for the Hawk 4000 is designed for installation in a standard 19-inch wide rack-cabinet.

2.5 Installing the Rack Mount Option

Instructions for installing the Hawk 4000 in a standard 19-inch (EIA) rack are as follows:

- A. Unfasten the top cover by removing six 8-32 x 5/16" screws located on each side of the unit.
- B. Remove top cover from unit.
- C. Remove the two (2) pieces of internal packing material located (a) behind the CRT and (b) above the printed circuit card rack. Make sure that all circuit boards are firmly seated.
- D. Replace the top cover.
- E. Install rack mount ears using the twelve 8-32 x 1/2" 1000 countersink screws supplied with option kit. Install six screws on each side of unit.

2.6 Electrical Installation

The Hawk 4000 requires an operating voltage of 115 volts AC, 60 Hz, 140 watts (maximum power consumption). A removable 6 ft. power cord, supplied with the unit, mates with a receptacle at the lower rear of the unit (see Figure 3.0-2). For 230 VAC, 50 Hz operation, a factory modification is required. The system is internally protected by a 2.0A SB fuse for 115 VAC operation (a 1.0A SB fuse is used for 230 VAC operation).

2.7 Modem-Terminal Interface Connections

The Hawk 4000 may be connected in-line to monitor or communicate interactively with either the modem or terminal, or bridged on-line to monitor the modem-terminal interface. Series or in-line monitoring and interactive communication are effected by connecting data communication and data terminal equipment to the rear panel TO DTE and TO DCE 25-pin EIA connectors. On-line (parallel) monitoring is accomplished by patching into the modem-terminal interface using the Monitor In 25-pin female EIA receptacle at the front of the Hawk 4000 panel.

Figures 2.7-1 and 2.7-2 show connections made to the front panel Monitor In receptacle. Figure 2.7-1 shows the configuration in which the Hawk 4000 can monitor on-line data. Figure 2.7-2 shows a functional block diagram of the Hawk 4000 in the bridged on-line monitor mode.

Figure 2.7-3 shows the Hawk 4000 configured so as to monitor data on-line in the system mode while also able to interact with a modem or terminal. Figure 2.7-4 shows a functional block diagram of the unit in the interactive or in-line monitor mode.

One six-foot male-female 25-pin EIA cable is supplied with the Hawk 4000. This cable is used along with existing cables to make the above described connections. Note that the Hawk 4000 can only interact with either the terminal or the modem at any one time even though both may remain plugged into the Datatrap.

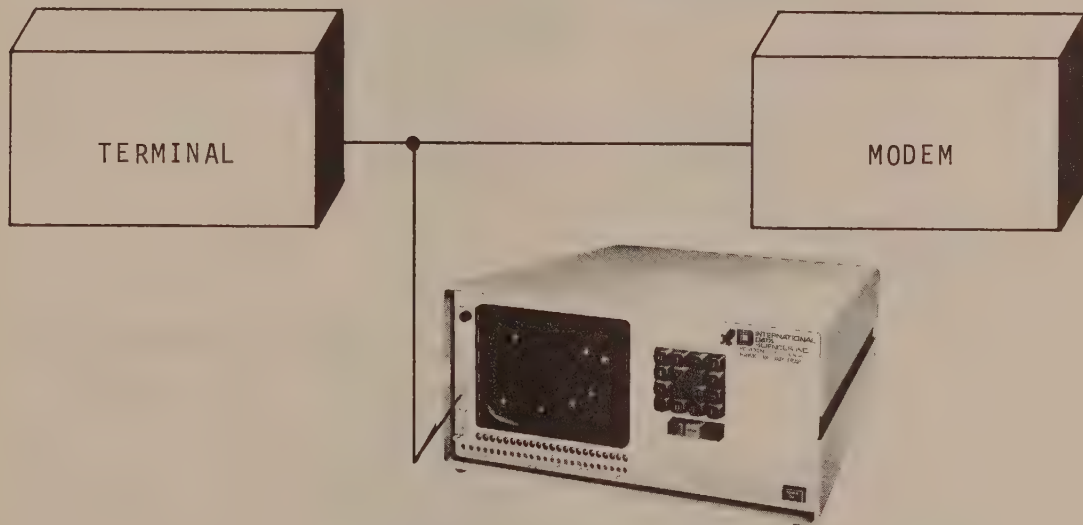


FIGURE 2.7-1. In this configuration, the Datatrap can monitor on-line data.

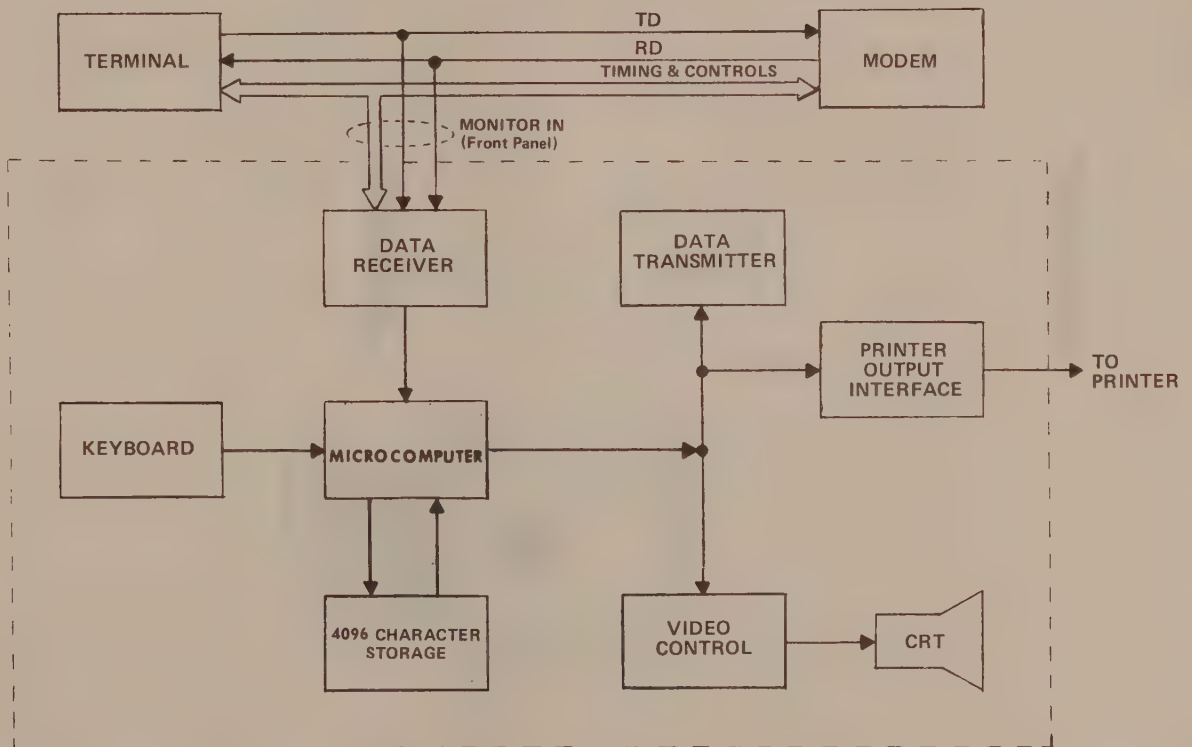


FIGURE 2.7-2. Functional Block Diagram of the Hawk 4000 Datatrap in the bridged on-line monitor mode.

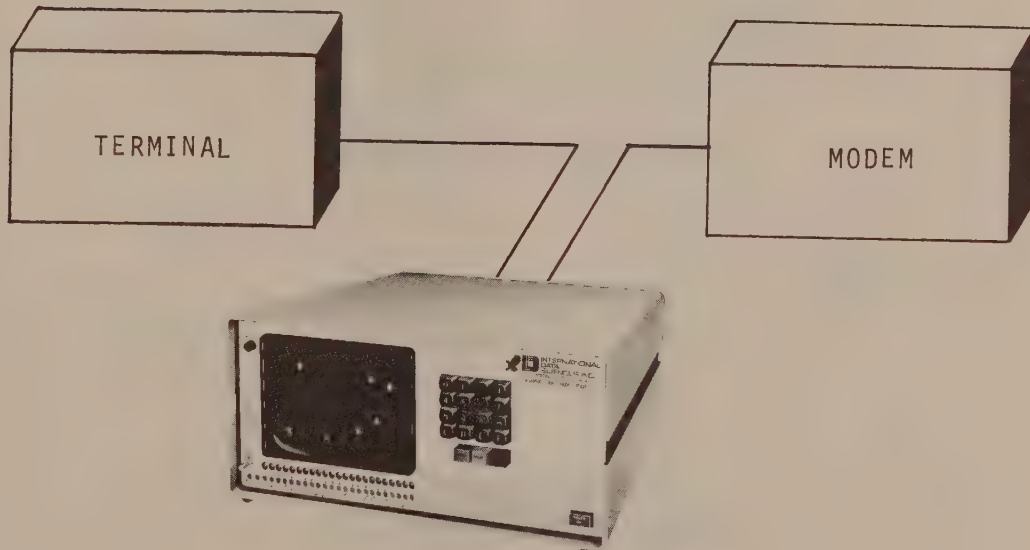


FIGURE 2.7-3. In this configuration, the Datatrap can monitor data on-line in the Monitor mode and can also interact with either the modem or terminal in the Interactive mode.

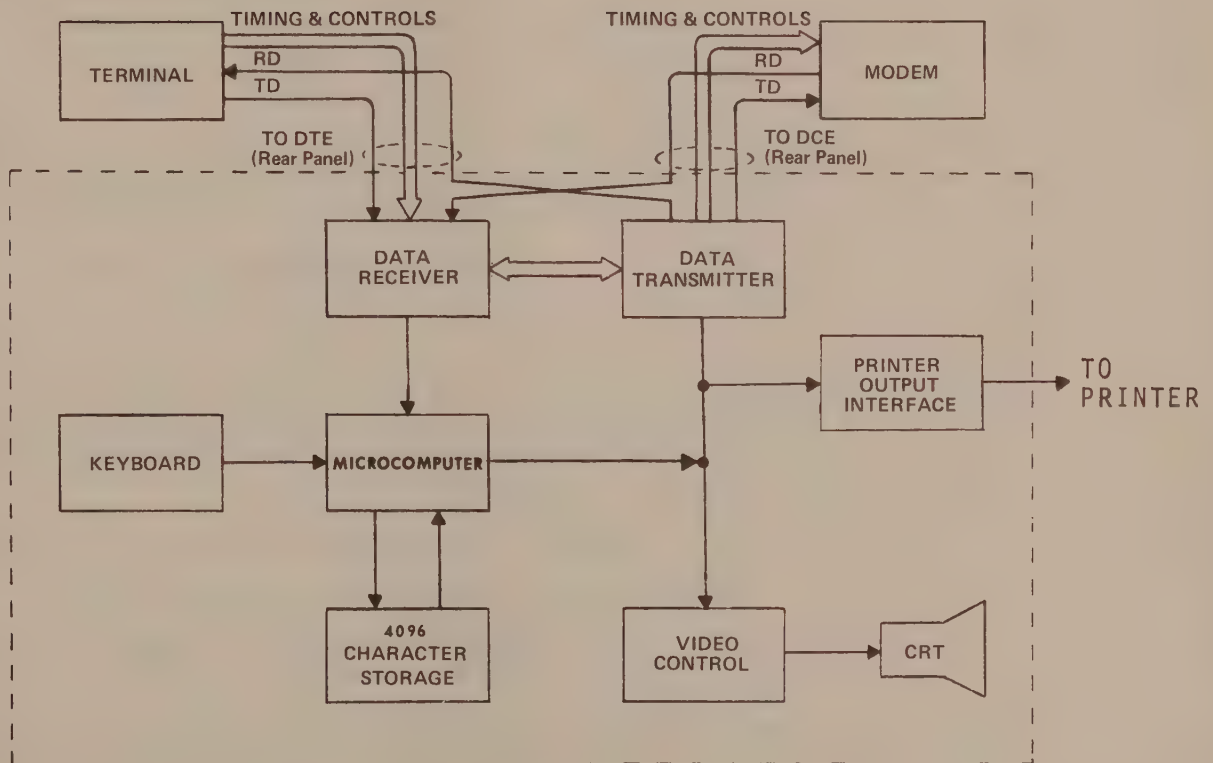


FIGURE 2.7-4. Functional Block Diagram of the Hawk 4000 Datatrap in the interactive or in-line monitor mode.

2.8 Input Signals

The Hawk 4000 accepts EIA RS-232C and MIL-STD-188B (henceforth referred to as EIA and MIL, respectively) signals at the "Monitor In", "To DTE", and "To DCE" connectors. The interface utilizes the standard 25 conductor cable with Cinch-Jones DB25S and DB25P connectors.

Input thresholds for EIA and MIL signals TD, RD, TC, and RC are as follows:

Positive threshold range

Min.	Max.
+1.2V	+3V

for a binary "0" or clock low; EIA and MIL excluding the TD and RD inputs for the latter. For MIL TD and RD inputs, the positive threshold range corresponds to a binary "1".

Negative threshold range

Min.	Max.
-1.2V	-3V

for a binary "1" or clock high; EIA and MIL excluding the TD and RD inputs for the latter. For MIL TD and RD inputs, the negative threshold range corresponds to a binary "0".

The input threshold for all EIA and MIL signals except TD, RD, TC, RC, FG, and SG are as follows:

Positive going threshold voltage range

Min.	Typ.	Max.
1.75V	1.9V	2.25V

for binary "0", clock low, or control "on" state; EIA and MIL.

Negative going threshold voltage range

Min.	Typ.	Max.
0.75V	0.97V	1.25V

for binary "1", clock high, or control "off" state; EIA and MIL.

The maximum input signal voltage levels for EIA and MIL signals is $\pm 25V$. The EIA and MIL signal input resistance is as follows:

Min.	Typ.	Max.
3K	5K	7K

2.8 Input Signals (continued)

The Hawk 4000 accepts control signals from a printer at the "To Printer" connector on the rear panel. The system accepts EIA control signals from serial printers and TTL control signals from parallel printers. The signal voltage level requirements for parallel printers are as follows:

	Min.	max.	
data "1"	+2V	+5.5V	$I_{OH}/\text{max} = 40 \text{ mA}$
data "0"	-1.5V	+0.6V	$I_{OL}/\text{max} = -1.2 \text{ mA}$

2.9 Output Signals

The Hawk 4000 transmits EIA and MIL output signals at the "TO DTE" and "TO DCE" rear panel connectors. The output voltage levels are as follows:

Positive Level		Negative Level	
min.	max.	min.	max.
+5V	+25V	-5V	-25V

A positive level corresponds to a binary "1" and a negative level to a binary "0" for MIL TD and RD signals. For all other EIA and MIL signals, a positive level corresponds to a binary "0", clock low, or control "on" state and a negative level corresponds to a binary "1", clock high, or control "off" state.

The output resistance for EIA and MIL output signals RD, RD, TC, RC, DCD, DSR, CTS, DTR, and RTS are as follows:

	min.	max.
Power On -		1100 Ω
Power Off -	300 Ω	

2.10 Connecting the Hawk 4000 to a Printer

The Hawk 4000 employs a printer interface connector which allows a wide range of serial and parallel printers to be attached to the unit. Use of a printer at this 'To Printer' connector provides a hard copy printout of the CRT display. This 36-pin, rear panel connector, labeled "To Printer", interfaces with parallel TTL, serial EIA RS-232, and TTY 20/60 mA current loop printers.

NOTE: The Hawk 4000 has an auto-sensing device that distinguishes between the types of printers that can be attached at the printer connection. This auto-sensing device automatically recognizes the type of printer being used and makes the necessary adjustments internally and without aid of the operator. A pin signal list is provided in Table 2.10.

TABLE 2.10. PRINTER INTERFACE PIN DESIGNATION

PIN NO.	DESCRIPTION
1	DATA STrobe
2	DATA BIT 0
3	DATA BIT 1
4	DATA BIT 2
5	DATA BIT 3
6	DATA BIT 4
7	DATA BIT 5
8	DATA BIT 6
9	DATA BIT 7
10	+ IN SENSE (TTL)
11	- IN SENSE (TTL)
12	- IN SENSE (TTL)
13	+ IN SENSE (TTL)
14	SERIAL/PARALLEL (NO CONNECTION SERIAL, GROUNDED PARALLEL)
15	OUTPUT CONTROL LINE (TTL)
16	SIGNAL GROUND
17	NC
18	SERIAL DATA OUTPUT
19	- IN SENSE (TTL)
20	- IN SENSE (TTL)
21	+ IN SENSE (TTL) (DEC COMPATIBLE)
22	+ IN SENSE (TTL) (DEC COMPATIBLE)
23	- IN SENSE (EIA)
24	+ IN SENSE (EIA)
25	+ IN SENSE (EIA)
26	SERIAL DATA TTY (OUT)
27	SERIAL DATA TTY (RETURN)
28	OUTPUT CONTROL LINE (EIA)
29	OUTPUT CONTROL LINE (EIA)
30	OUTPUT CONTROL LINE (TTL)
31	TTY/EIA (NO CONNECTION TTY, GROUNDED EIA)
32	+ IN SENSE (TTL)
33	- IN SENSE (TTL)
34	- IN SENSE (EIA)
35	PR CONT (CONNECT TO PIN 16)
36	NC

NOTES:

1. PART NO. CINCH 57-30360 36 PIN MALE.
2. TTL SENSE LINES ARE ACTIVATED FOR PARALLEL PRINTERS ONLY.
3. EIA SENSE LINES ARE ACTIVATED FOR SERIAL EIA PRINTERS ONLY.
4. THE STANDARD M4000 EIA OUTPUT RATE IS 300 BPS, AND THE TTY OUTPUT RATE IS 110 BPS.

3.0 CONTROLS, DISPLAYS, AND CONNECTORS

The function of each control, indicator, and connector is described in this section. The controls and connectors are listed by its label when possible. Figures 3.0-1 and 3.0-2 are line drawings of the front and rear panels, respectively.

3.1 Lamp Test

The Lamp Test pushbutton illuminates all 23 LEDs on the front panel of the unit for test purposes.

3.2 Ground Test Jacks (FG and SG)

The two test jacks labeled FG (Frame Ground) Pin 1; and SG (Signal Ground) Pin 7, provide reference points for signal observation.

3.3 Test Jacks

Miniature test jacks, each aligned with an LED indicator, provide individual access to all EIA signal conductors. Each test jack is labeled with the pin number and mnemonic name as specified by the EIA RS-232C interface.

3.4 LED Display

A row of twenty-three LED indicators monitor all EIA signal activity.

3.5 Monitor In

A 25-pin quick connect/disconnect EIA connector used to bridge or patch into the modem-terminal interface for monitoring data.

3.6 Brightness

This control knob varies the brightness of the CRT display.

3.7 CRT Display

The nine-inch (diagonal measurement) CRT provides a visual display of all data traffic at the modem-terminal interface, the menu pages, and the contents of the 4096-character buffer storage. Non-printing control characters are displayed in a two-character alphanumeric form of the Proposed American Standard for Graphic Representation of ASCII Control Characters.

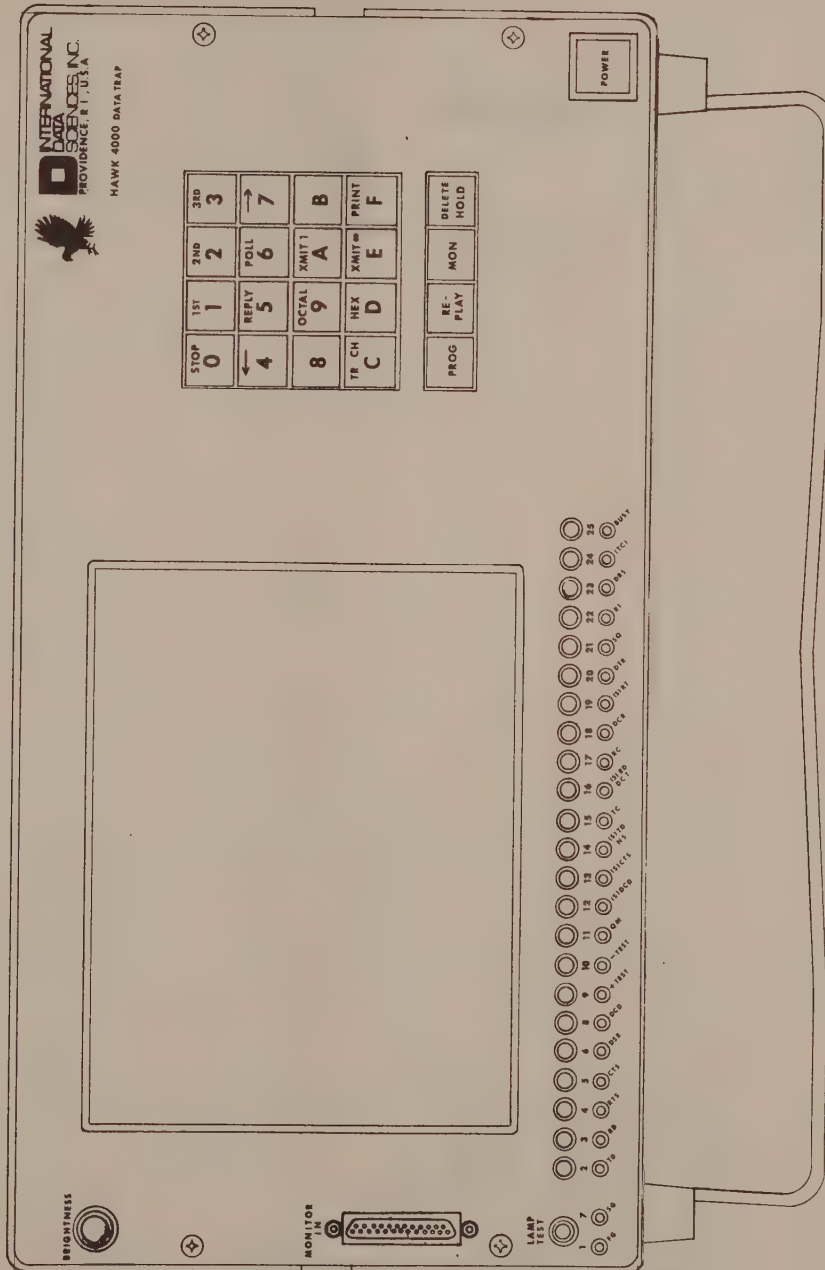


FIGURE 3.0-1. HAWK 4000 DATATRAP FRONT PANEL LINE DRAWING

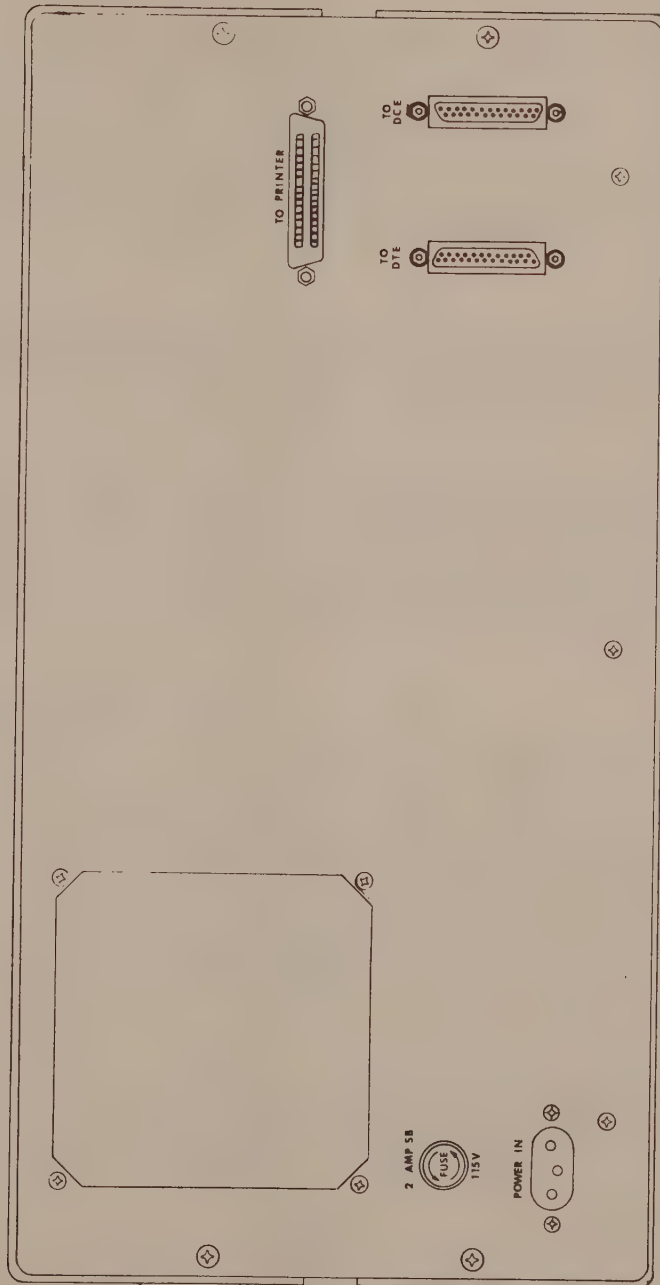


FIGURE 3.0-2. HAWK 4000 DATATRAP REAR PANEL LINE DRAWING

3.7 CRT Display (continued)

The CRT display uses 512 character locations arranged in a 16-row by 32-character matrix. ASCII and EBCDIC characters are displayed in a 7 x 9 dot font in an overall 11 x 15 dot field for each character location. Hexadecimal characters are displayed in a 4 x 6 dot matrix with two side-by-side hex digits in the same 11 x 15 dot character location. Octal characters are displayed in a 4 x 6 dot matrix also. The most significant octal digit is displayed as 0, 1, or 2 dots above the character in the same 11 x 15 dot location.

New data moves left to right and top to bottom on the screen with one row of demarcation between old and new data. In all CRT display modes, the received characters appear underlined. The display may be stopped for visual analysis at any point of interest.

A negative image (black character on white background) is displayed as an event marker for the TD Mark and RD Mark selections. This negative image is activated automatically when any one of the twelve TD Mark and RD Mark events is detected. The display also provides a blinking character image as an event marker when any one of the twelve TD Trap and RD Trap event selections is detected.

3.8 Keyboard Command System

A twenty-key control and data entry keyboard is used to operate all functions of the Hawk 4000. The hexadecimal section, consisting of sixteen grey keys labeled 0-9, A-F, is used for data entry and control functions. A row of four command keys, labeled PROG, REPLAY, MON, and DELETE/HOLD, select the operational modes of the Hawk 4000. The use of this twenty-key keyboard is simplified by the display of two menu pages on the CRT. The menu pages, along with a unique queing and prompting display scheme, using lighted color coded keys, aid the user in program selection and operation.

Fourteen of the hexadecimal keys are used for special functions and have corresponding legends in addition to the hex legend on the key. The fourteen special function keys, their legend, and color of legend are listed below:

<u>Key</u>	<u>Legend</u>	<u>Legend Color</u>
0	STOP	Yellow
1	1st	Yellow
2	2nd	Yellow
3	3rd	Yellow

3.8 Keyboard Command System (continued)

<u>Key</u>	<u>Legend</u>	<u>Legend Color</u>
4		Yellow
5	REPLY	Green
6	POLL	Green
7		Yellow
9	OCTAL	Yellow
A	XMIT 1	Green
C	TR CH	Yellow
D	HEX	Yellow
E	XMIT ∞	Green
F	PRINT	Red

The color of the legend on the key corresponds to one of the four command keys. Their functions are described in Section 5.0, Operation.

The four command keys are legended and colored as follows:

<u>Legend</u>	<u>Key Color</u>
PROG	White
REPLAY	Yellow
MON	Green
DELETE/HOLD	Red

The PROG key allows the operator to program all "switches" stored in memory, utilizing the Hex keyboard. Repeated depression of this key flips between the two menu pages of switches. The Program key is fully described in Section 4.0, Programming.

The REPLAY key allows the operator to recall data from the 4096-character buffer. This data can be scanned forward or backward under control of the Hex keyboard. Three scanning speeds in both directions are provided. The displayed data can also be changed from the programmed code selection (see Section 4.5, Code) to Octal or Hex formats at the press of a key. The Replay key is fully described in Section 5.0, Operation.

The MON (Monitor) key puts the Hawk in the Monitor Mode. This mode allows the unit to monitor and display data appearing at the modem-terminal interface; or data transmitted and received by the Hawk. The data is displayed in real time and is continually stored in a 4096-character buffer. The Monitor key is fully described in Section 5.0, Operation.

The Delete/Hold key is the only command key that has a secondary function. The Hold function allows the operator to freeze the CRT display of data for visual analysis. The Hold function is fully described in Section 5.0, Operation.

3.8 Keyboard Command System (continued)

Delete is a secondary function of the Hold key. This function allows the operator to delete the last character entered into the user message or into character strings during programming operations. The Delete function is further described in Section 4.0, Programming.

3.9 Power

This rocker-action switch energizes the unit.

3.10 To Printer

A 36-pin female connector used to interface a printer to the Hawk for a hard copy output of the displayed data. The Hawk 4000 can drive a variety of serial and parallel TTL, 20/60 mA current loop and EIA printers such as Teletype® and DECprinter. This interface employs an auto-sensing feature used to distinguish between a serial or parallel printer.

3.11 To DTE

A 25-pin EIA female connector used to connect the Datatrap to a terminal for in-line or interactive monitoring.

3.12 To DCE

A 25-pin EIA male connector used to connect the Datatrap to a modem for in-line or interactive monitoring.

3.13 Power In

This male 3-pin grounded receptacle mates with a standard line cord (Belden No. 17258-5), supplied with the unit.

4.0 PROGRAMMING THE HAWK 4000

The Hawk 4000 employs a flexible, user-oriented control system which stores all control "switches" in memory and is operated by means of a sixteen-key keyboard mounted on the front panel. An internal microprocessor receives the instructions from the operator and sets the appropriate switches to the desired settings. The switches and their settings are listed on two menu pages (see Figures 4.0-1 and 4.0-2) which are displayed one at a time on the CRT.

The Hawk 4000 employs five display guides to aid the user in programming the Hawk 4000: Cueing and prompting - messages or choice selections are sequentially provided on the CRT to guide the user in properly setting up a program. A typical example is the message "Enter char as two Hex digits. Push "Prog" to exit." appearing on the CRT.

Blinking arrow (->) - used to indicate to the user the particular switch selection that is to be made. This arrow appears on the left of the menu pages between the switch selections and their respective identifying numbers.

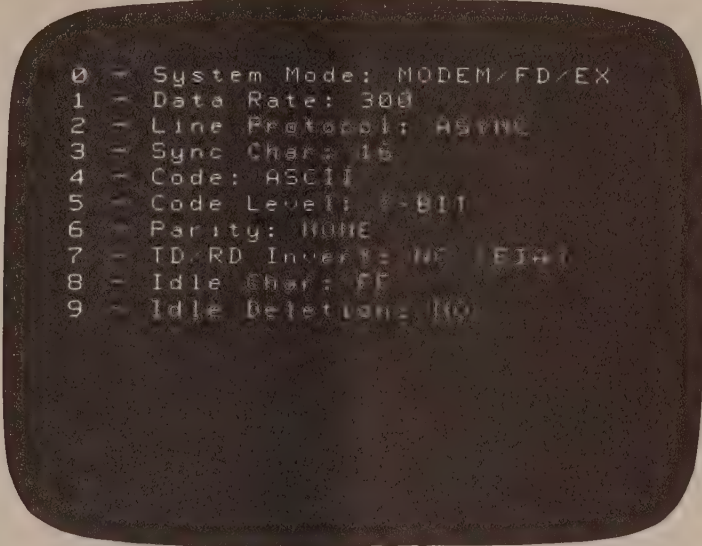
Double Dash (--) - a reminder sign used to indicate to the user the last switch setting programmed into the Hawk 4000.

Negative (or Reversed) Characters - are used to indicate Mark characters. These characters appear on the CRT as black-on-white and are used to indicate that any one of twelve selectable events has occurred.

Blinking characters - are used to indicate Trap characters. Trap characters indicate the presence of a trap event; a trap character is a character that arrives coincidentally with the occurrence of a trap event. The Hawk 4000 will search for and trap on a character string up to 127 characters long, including "Don't Cares". Trap characters must be selected before the Hawk 4000 will operate in the Reply mode or before the interval timer will operate.

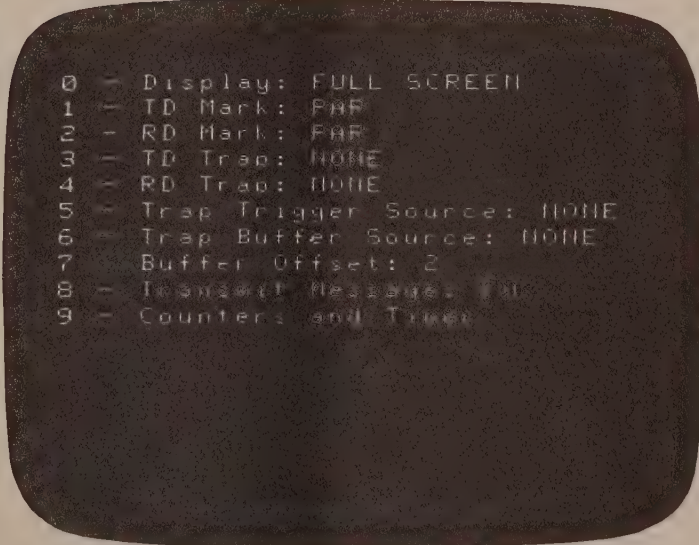
Menu Page 0 is displayed and the keyboard activated by pressing the Program key, which places the Hawk 4000 in the Program mode. The operator may now flip between Menu Page 0 and Menu Page 1 by repeatedly pressing the Program key.

To illustrate how a status switch may be set or changed, consider the following example:



```
0 - System Mode: MODEM/FD/EX
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: ASCII
5 - Code Level: 1-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EJAT)
8 - Idle Char: FF
9 - Idle Deletion: NO
```

FIGURE 4.0-1. MENU PAGE 0



```
0 - Display: FULL SCREEN
1 - TD Mark: PAR
2 - RD Mark: PAR
3 - TD Trap: NONE
4 - RD Trap: NONE
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
8 - Insert Messages: YES
9 - Counters and Traps
```

FIGURE 4.0-2. MENU PAGE 1


```

--> System Mode: MODEM
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: ASCII
5 - Code Level: 7-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO

0 - MONITOR
1 - TERMINAL
2 - MODEM

```

FIGURE 4.0-3. SYSTEM MODE SELECTIONS

```

--> System Mode: MODEM/HD
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: ASCII
5 - Code Level: 7-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO

0 - NORMAL
1 - EXT TIMING

```

FIGURE 4.0-5. MODEM SUB-SELECTIONS

```
-> System Mode: MODEM
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: ASCII
5 - Code Level: 7-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO

0 - HALF DUPLEX
1 - FULL DUPLEX
```

FIGURE 4.0-4. MODEM SUB-SELECTIONS

```
0-- System Mode: MODEM/HD/EX
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: ASCII
5 - Code Level: 7-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO
```

FIGURE 4.0-6. SYSTEM MODE SELECTION UPDATE

4.0 PROGRAMMING THE HAWK 4000 (continued)

Figure 4.0-1 shows Menu page 0 with the control switches set as indicated. Notice that the System Mode switch is set to MODEM/FD/EX. Let us assume that the operator wishes to select operation as a half-duplex (HD) modem as the new switch setting. To do this the operator proceeds as follows:

Press the "0" key on the keyboard. This selects the System Mode switch which is listed as switch #0 on Menu Page 0. Upon depressing the key, the menu page display changes as shown in Figure 4.0-3. Note that a blinking arrow points to the selected status switch and the available selections for that switch are listed on the bottom of the screen. To make the change from MODEM/FD/EX to MODE/HD/EX, Hex key #2 is first pressed to enter the MODEM selection.

Notice that the blinking arrow remains in position, indicating that another selection must be made. The new switch selections are listed on the bottom of the screen, as shown in Figure 4.0-4. As half-duplex operation is now desired, the #0 key is pressed to enter this switch selection. The CRT then shows the new entry as in Figure 4.0-5.

The blinking arrow still remains so as to indicate that more information is required. The new switch selections are presented at the bottom of Figure 4.0-5. When Hex key #1 has been used to enter the External Timing option, Menu Page 0 appears as shown in Figure 4.0-6. The System Mode shows that the Hawk 4000 is now prepared for half-duplex (HD) operation.

Note that a double dash has now replaced the blinking arrow, indicating that all of the information required for System Mode operation has been properly programmed into the Hawk 4000. The double dash serves to remind the operator that he has just entered information into the System Mode switch.

If the operator pressed a key on the Hex keyboard that does not correspond to any of the available selections for that switch, the following warning will be displayed at the bottom of the screen:

*** ILLEGAL: RE-ENTER ***

The operator should then make a legal selection.

When the operator wishes to change the status of another status switch on page 0, he merely selects the status switch via the keyboard and repeats the above process. If he wishes to flip



4.0 PROGRAMMING THE HAWK 4000 (continued)

to another status page, he merely pushes the Program Key causing the next status page to be displayed. Or, he may push another system mode key switch and leave the Program mode.

NOTE: All programmed switch settings, the contents of the transmit buffer, and the character match buffers are saved in memory. This feature eliminates the need to program the Hawk before each use.

4.1 System Mode

This switch determines the Hawk's monitoring characteristics, which are either on-line monitor or one of two interactive modes. The selections are displayed in Figure 4.1-1. The MONITOR option is selected when the Hawk is to only monitor on-line and trap data with no transmit and reply capability. When this option is selected, a second option appears on the CRT as shown in Figure 4.1-2. The NORMAL selection allows the Hawk to use the transmitter (TC) clock on pin 15 of the EIA Interface to monitor the Transmit Data (TD). The EXT TIMING selection allows the Hawk to use the Ext Transmitter Clock (TC) on pin 24 to monitor the TD. See Figure 4.1-3.

The TERMINAL option is selected when the Hawk is to act as a terminal and communicate interactively with a modem, remote terminal, or host computer. When this option is selected, another option appears on the CRT as shown in Figure 4.1-4. This option allows the Hawk to act as a Half of Full-Duplex Terminal. Upon making that selection, another option appears on the CRT as shown in Figure 4.1-5. This option selects the Transmitter Clock on pins 15 or 24 as described for the MONITOR option. See Figure 4.1-6.

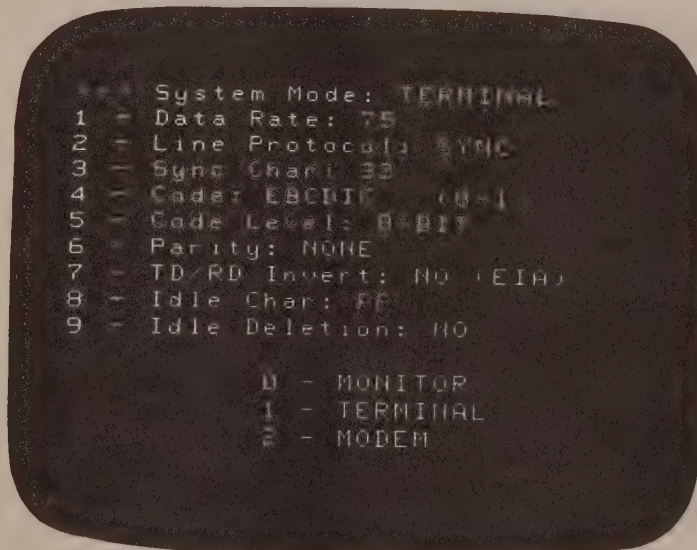


FIGURE 4.1-1. SYSTEM MODE SELECTIONS

4.1 System Mode (continued)

The MODEM option is selected when the Hawk is to act as a modem and communicate interactively with terminals or the host computer. The MODEM sub-selections are the same as described for the TERMINAL option.

When in the TERMINAL or MODEM System modes, the Hawk is connected to the data link via the rear panel connectors labeled "To DTE" and "To DCE", respectively. The Hawk can only interact with either the terminal or modem at any one time even though both may remain connected.

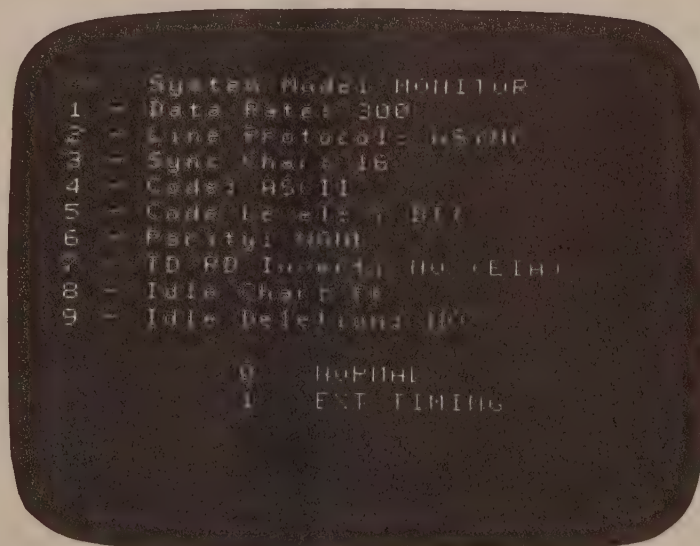


FIGURE 4.1-2. MONITOR SUB-SELECTIONS


```

0 -> System Mode: MONITOR/EX
1 -> Data Rate: 300
2 -> Line Protocol: ASYNC
3 -> Sync Char: 16
4 -> Code: ASCII
5 -> Code Level: 7-BIT
6 -> Parity: NONE
7 -> TD/RD Invert: NO (EIA)
8 -> Idle Char: FF
9 -> Idle Deletion: NO

```

FIGURE 4.1-3. SYSTEM MODE UPDATE

```

->> System Mode: TERMINAL/ED
1 -> Data Rate: 300
2 -> Line Protocol: ASYNC
3 -> Sync Char: 16
4 -> Code: ASCII
5 -> Code Level: 7-BIT
6 -> Parity: NONE
7 -> TD/RD Invert: NO (EIA)
8 -> Idle Char: FF
9 -> Idle Deletion: NO

```

```

0 - NORMAL
1 - EXT TIMING

```

FIGURE 4.1-5. TERMINAL SUB-SELECTIONS



```
--> System Mode: TERMINAL
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: ASCII
5 - Code Level: 7-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO

0 - HALF DUPLEX
1 - FULL DUPLEX
```

FIGURE 4.1-4. TERMINAL SUB-SELECTIONS

```
0--> System Mode: TERMINAL/FD/EX
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: ASCII
5 - Code Level: 7-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO
```

FIGURE 4.1-6. SYSTEM MODE UPDATE

4.2 Data Rate

This switch controls the data rate being used by the system for timing purposes. The selections are displayed in Figure 4.2. If the EXT (External) option is selected, the system will use the clocks provided by the modem for both transmit and receive synchronous data. If any one of the other options is selected (75 - 19,200 bps), the Hawk will provide its own internal timing for transmit and receive asynchronous data at the selected rate.

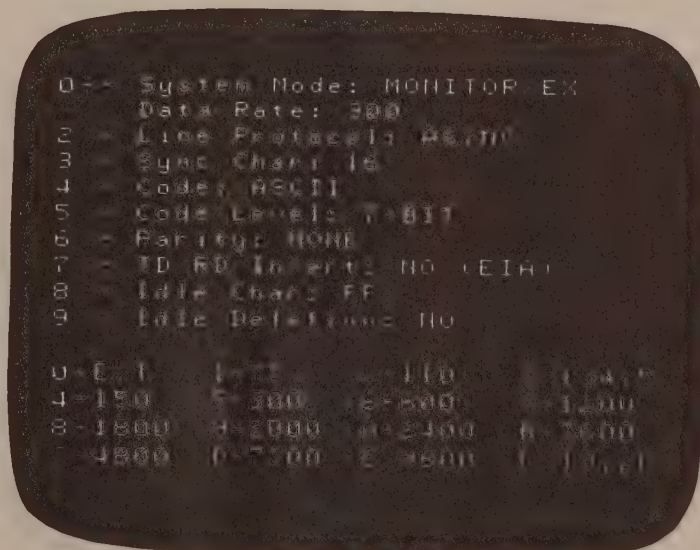


FIGURE 4.2. DATA RATE SELECTIONS

4.3 Line Protocol

This switch determines the protocol being used for transmit and receive data between the modem and terminal. The selections are displayed in Figure 4.3. The ASYNC option refers to the asynchronous line mode where the transmit and receive data is in character format with start and stop bits provided for character distinction and timing. The SYNC option corresponds to the synchronous line mode where clocks are provided by the modem for timing. The Datatrap transmits and receives data in IBM BISYNC, DDMCP, or any character-oriented synchronous protocol utilizing two sync characters. In the SDLC mode, data can be received in either ADCCP, V.25, or HDLC line protocols using the HDLC flag (01111110). Automatic zero destuffing is provided in this mode.

The Hawk 4000 cannot operate interactively as a modem or terminal when SDLC has been selected.

NOTE: In asynchronous line mode, it is assumed that the transmit and receive data clock rates are equal. In BISYNC and synchronous line protocol modes, the system is slaved to modem transmit and receive clocks.

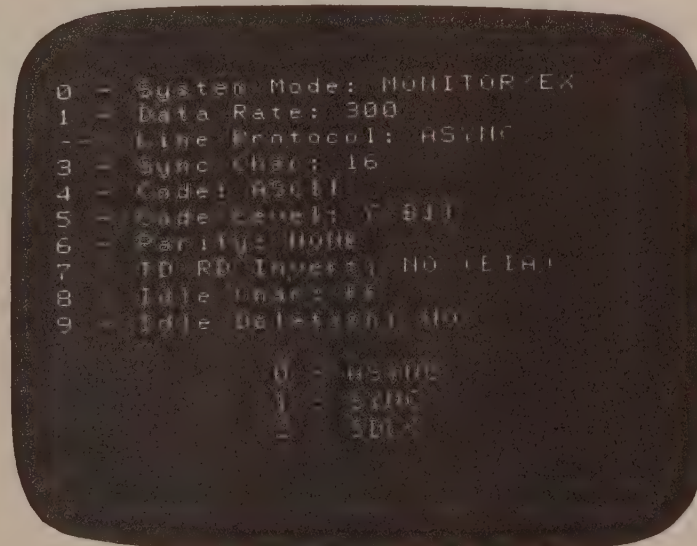


FIGURE 4.3. LINE PROTOCOL SELECTIONS

4.4 Sync Char

This switch allows the Hawk to operate with any synchronous line protocol utilizing selectable sync characters. The operator enters the character as two Hex digits. See Figure 4.4. Any 5, 6, 7, or 8-bit sync character may be selected.

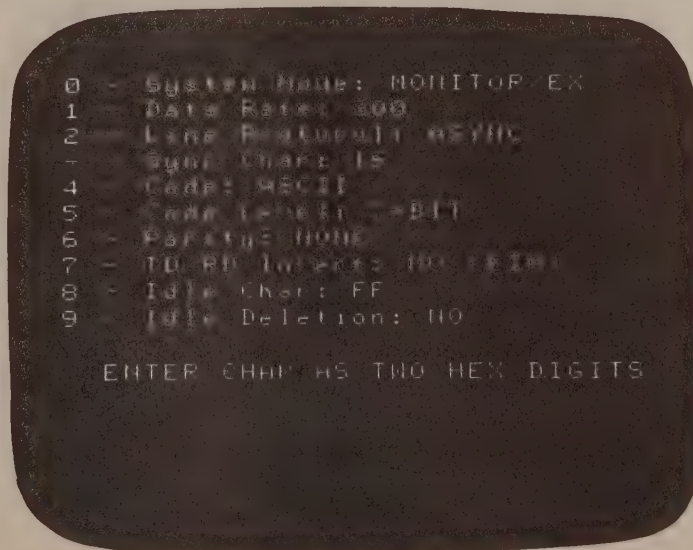


FIGURE 4.4. SYNC CHAR SELECTIONS

4.5 Code

This switch controls how data is interpreted by the Hawk 4000 and displayed on the screen. The options are displayed in Figure 4.5-1. Selection of any option except ASCII will display the sub-selections shown in Figure 4.5-2. The (1-8) selection decodes an 8-bit pattern in which the most significant bit is received first by the Hawk. The (8-1) selection decodes the 8-bit pattern in which the least significant bit is received first.

NOTE: For TRANSCODE, FIELD, BAUDOT, EBCD, and SELECTRIC, the Hawk can only operate at data rates up to 9600 bps.

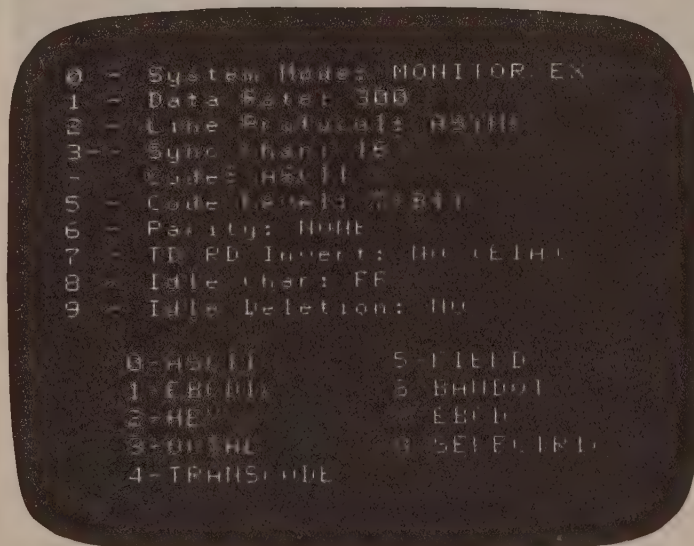
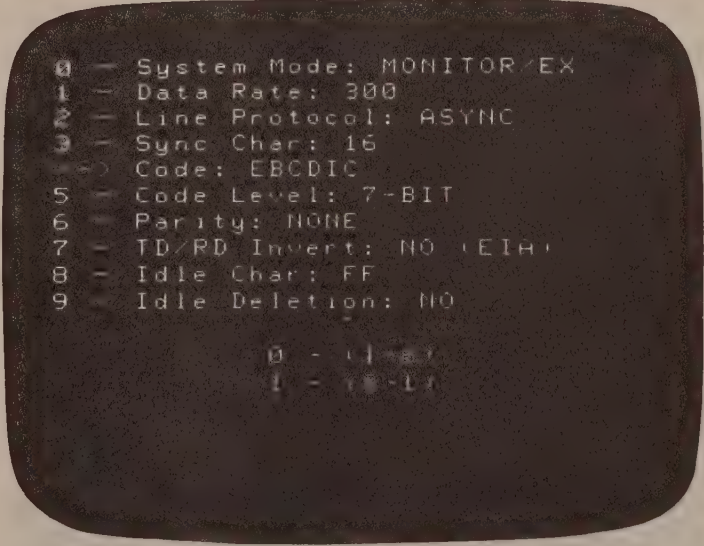


FIGURE 4.5-1. CODE SELECTIONS



```
0 - System Mode: MONITOR/EX
1 - Data Rate: 300
2 - Line Protocol: ASYNC
3 - Sync Char: 16
4 - Code: EBCDIC
5 - Code Level: 7-BIT
6 - Parity: NONE
7 - TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO
```

```
0 - Clear
1 - Test
```

FIGURE 4.5-2. CODE SUB-SELECTIONS

4.6 Code Level

This switch determines the length of the data portion of a character. The operator enters the number of code bits. See Figure 4.6. When this switch is programmed for 8-bit, the parity bit is not displayed.

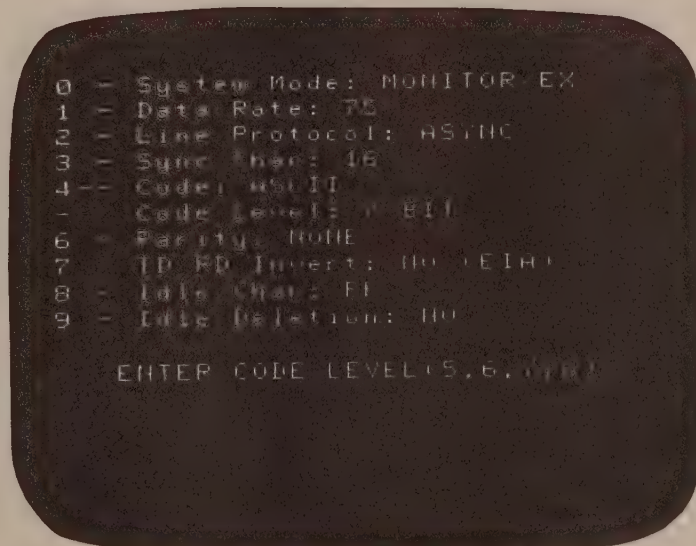


FIGURE 4.6. CODE LEVEL SELECTIONS

4.7 Parity

This switch allows the Hawk to be compatible with any parity checking system. The selections are displayed in Figure 4.7. The NONE selection disables parity checking. The ODD selection allows the Datatrap to perform a parity check on systems using an odd parity. The EVEN selection performs a parity check on systems using an even parity.

NOTE: When the Code Level switch has been programmed for 8-bits, the parity bit is not displayed.

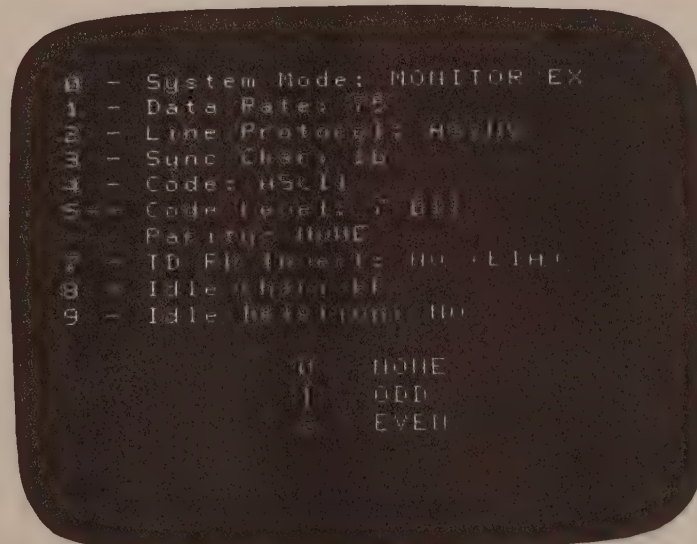
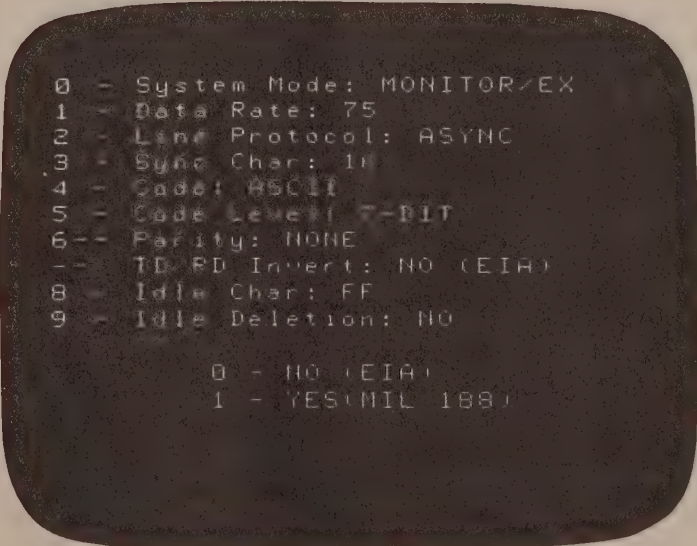


FIGURE 4.7. PARITY SELECTIONS

4.8 TD/RD Invert

This switch allows the Hawk to invert the serial transmit data (TD) and receive data (RD) inputs. The selections are displayed in Figure 4.8. The YES option inverts the incoming data before processing. This allows the Datatrap to monitor and MIL-188 Interface. The NO option does not invert the incoming data and is selected when monitoring the EIA RS-232 interface.



```
0 - System Mode: MONITOR/EX
1 - Data Rate: 75
2 - Line Protocol: ASYNC
3 - Sync Char: 1H
4 - Code: ASCII
5 - Code Length: 7-BIT
6-- Parity: NONE
-- TD/RD Invert: NO (EIA)
8 - Idle Char: FF
9 - Idle Deletion: NO

      0 - NO (EIA)
      1 - YES (MIL 188)
```

FIGURE 4.8. TD/RD INVERT SELECTIONS

4.9 Idle Char

This switch allows the operator to specify the idle character. See Figure 4.9. An idle character is used to maintain synchronization during a period of no data transmission. The operator enters the character, via the keyboard, as two Hex digits.

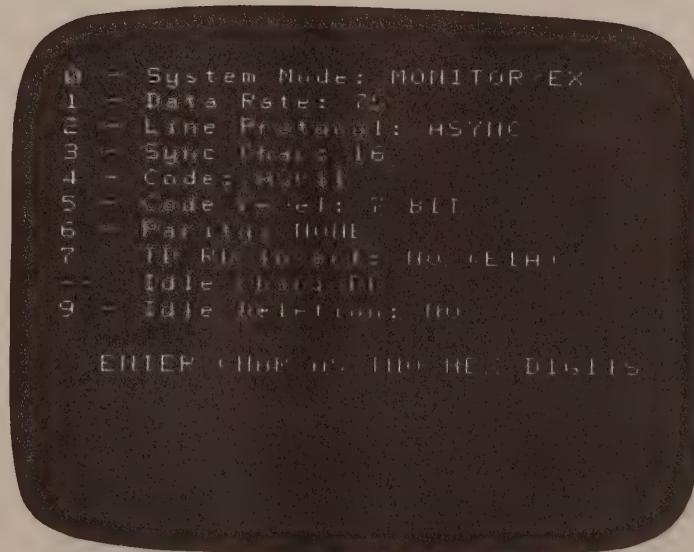


FIGURE 4.9. IDLE CHAR SELECTION

4.10 Idle Deletion

This switch allows the Hawk to delete all occurrences of an idle character. An idle character is used to maintain synchronization during a period of no data transmission. All idle characters are deleted after the first eight consecutive idle characters have been received. The selections are displayed in Figure 4.10. The NO selection allows all idle characters to be displayed on the screen. The YES selection provides idle deletion.

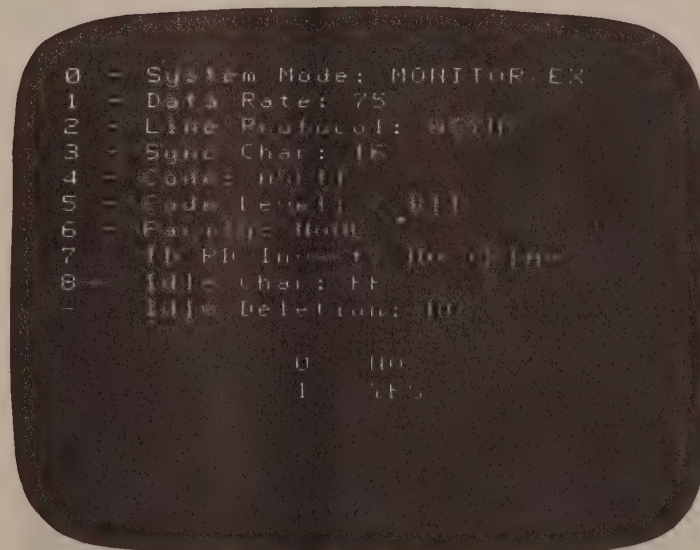


FIGURE 4.10. IDLE DELETION SELECTIONS

4.11 Display

This switch controls how data is displayed on the CRT. The selections are displayed in Figure 4.11-1. In all Display selections, the received characters appear underlined.

The FULL SCREEN selection displays the Transmit Data (TD) and Receive Data (RD) on a row-by-row basis in chronological order, as acquired from the monitored data link. With one blank row of demarcation used to separate old from new data, the CRT display can contain a maximum of 480 characters. See Figure 4.11-2.

In the SPLIT SCREEN selection, the display is split in half as shown in Figure 4.11-3. The top half is filled row-by-row with transmit characters and the lower half, row-by-row with receive characters. Each half contains 224 characters and has its own blank row of demarcation.

The ROW INTERLEAVED selection displays alternate rows of transmit and receive characters, as shown in Figure 4.11-4. There are 224 characters displayed in each set of data. A blank row of demarcation is generated for both TD and RD characters.

The EIA CHARACTER PAIR selection displays data similar to ROW INTERLEAVED, but no transmit and receive characters are displayed. A DEL () is displayed for each character received, as shown in Figure 4.11-5.

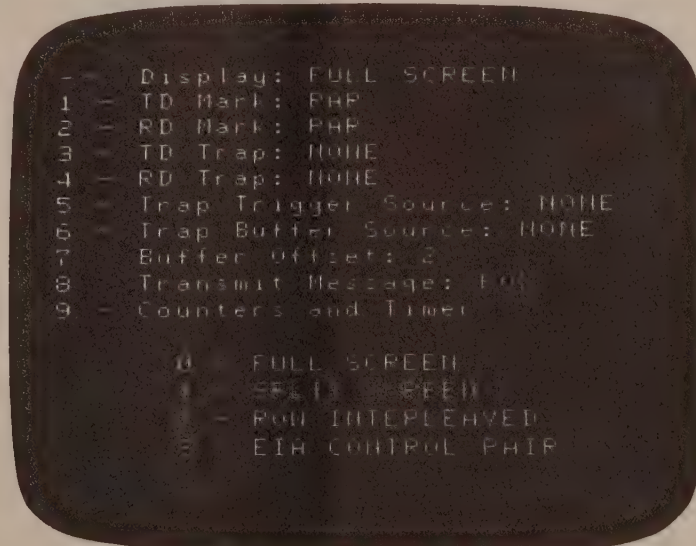


FIGURE 4.11-1. DISPLAY SELECTIONS

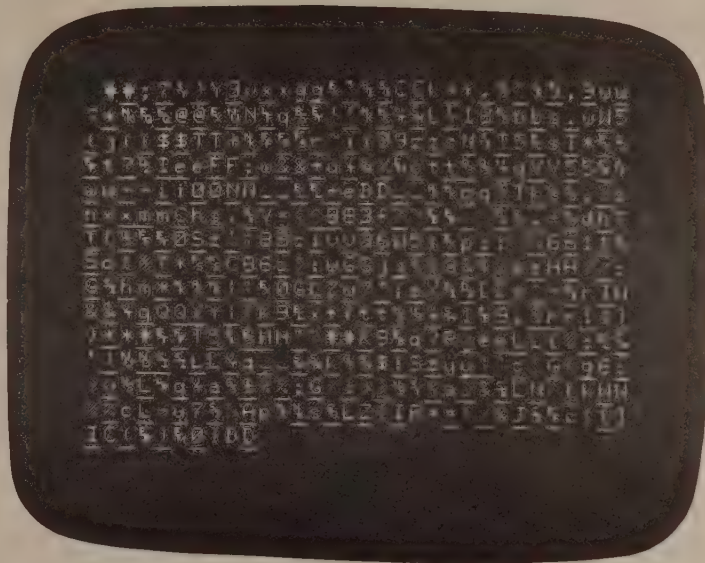


FIGURE 4.11-2. FULL SCREEN

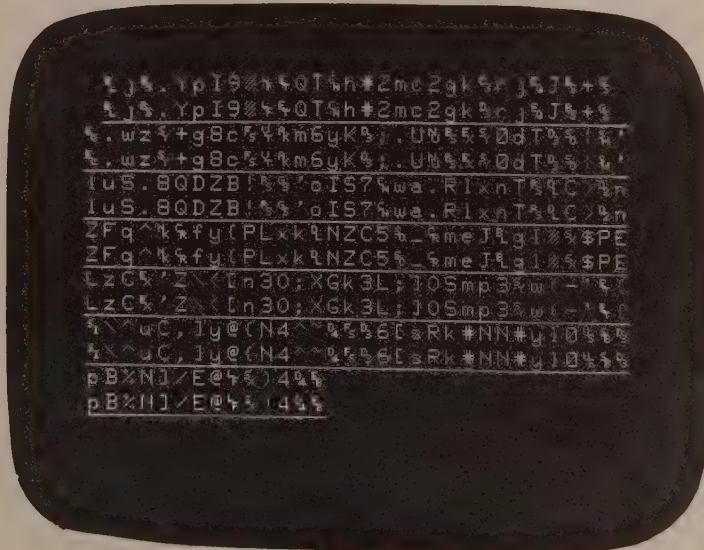


FIGURE 4.11-4. ROW INTERLEAVED

B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y
Z



4.12 TD Mark

This switch allows a TD character to be marked (negative image) when any one of the twelve selectable events occur. The selections are displayed in Figure 4.12-1. If NONE is selected, no Mark functions are enabled. The SYNC selection provides a negative image (black-on-white) character whenever a synchronization event occurs. The PAR selection will provide a negative image when a parity error is detected. FRM will provide a negative image when a framing error is detected (ASYN mode only).

For EIA control line protocol selections (RTS, CTS, DSR, DCD, DTR, SQ, RI, and BUSY), another setting must be selected. See Figures 4.12-2 and 4.12-3. The LOW selection allows the EIA control line character to be marked when the signal appears low (OFF). Likewise, the HIGH selection allows the EIA control line character to be marked when the signal appears high (ON). A negative image will be displayed whenever the event occurs.

For the CHAR selection, the operator must enter a character as two hex digits via the keyboard. See Figures 4.12-4 and 4.12-5. A negative image will be displayed whenever the selected character is received.

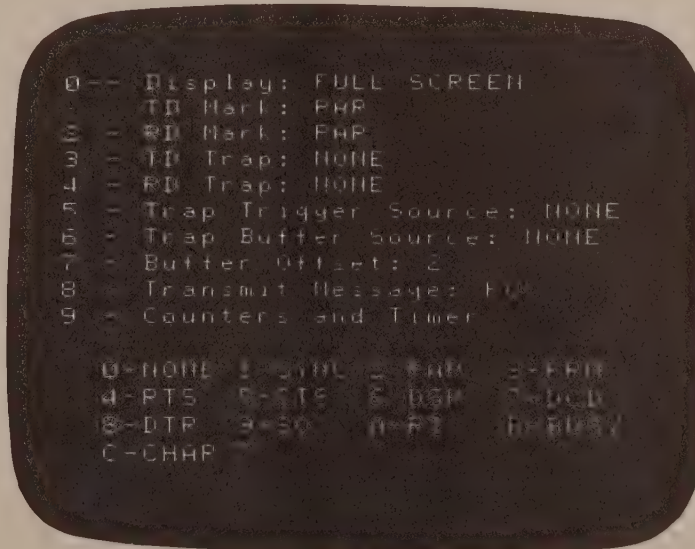


FIGURE 4.12-1. TD MARK SELECTIONS

0 - Display: FULL SCREEN
1 - TD Mark: RTS
2 - RD Mark: PAR
3 - TD Trap: NONE
4 - RD Trap: NONE
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
8 - Transmit Message: USER
9 - Counters and Timer

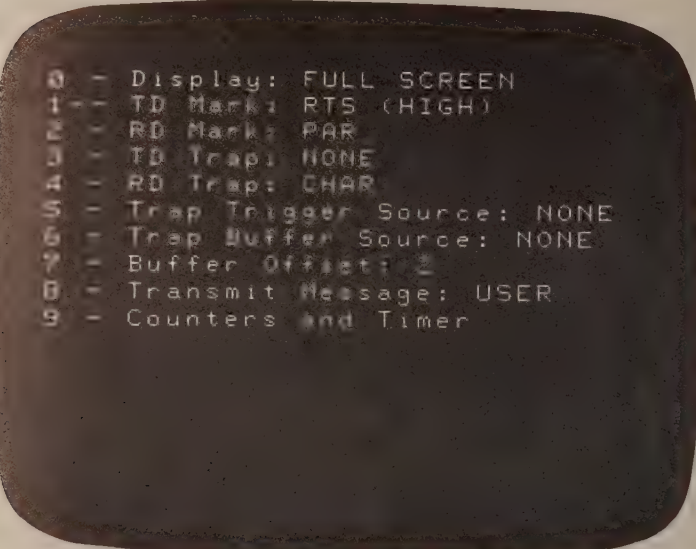
0 - (LOW)
1 - (HIGH)

FIGURE 4.12-2. EIA CODE SUB-SELECTIONS

0 - Display: FULL SCREEN
1 - TD Mark: PAR
2 - RD Mark: PAR
3 - TD Trap: NONE
4 - RD Trap: NONE
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
8 - Transmit Message: USER
9 - Counters and Timer

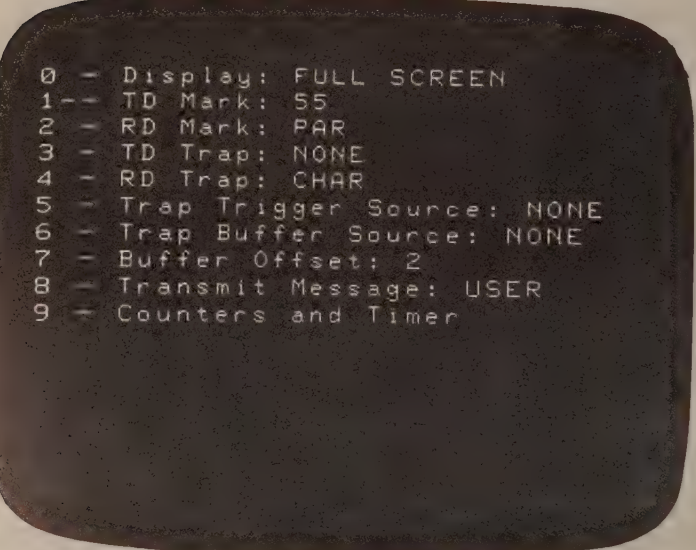
ENTER CHAR AS TWO HEX DIGITS

FIGURE 4.12-4. CHAR CODE SUB-SELECTIONS



```
0 - Display: FULL SCREEN
1-- TD Mark: RTS (HIGH)
2 - RD Mark: PAR
3 - TD Trap: NONE
4 - RD Trap: CHAR
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
8 - Transmit Message: USER
9 - Counters and Timer
```

FIGURE 4.12-3. EIA CODE ENTERED



```
0 - Display: FULL SCREEN
1-- TD Mark: 55
2 - RD Mark: PAR
3 - TD Trap: NONE
4 - RD Trap: CHAR
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
8 - Transmit Message: USER
9 - Counters and Timer
```

FIGURE 4.12-5. CHAR CODE ENTERED

4.13 RD Mark

This switch allows a RD character to be marked (negative image) when any one of the twelve selectable events occur. The selections are displayed in Figure 4.13. These selections are the same as for TD Mark. For a description of each selection, see Section 4.12, TD Mark.

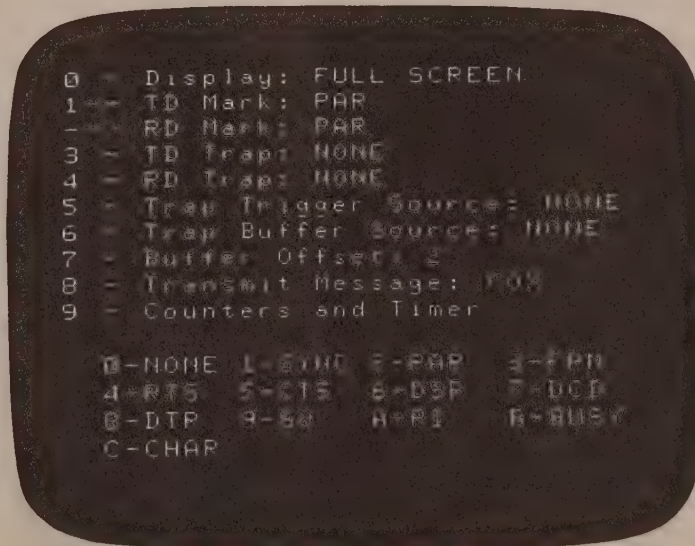


FIGURE 4.13. RD MARK SELECTIONS

4.14 TD Trap

This switch allows the operator to set the conditions for trapping. The presence of a trap event on the TD side will be displayed by a blinking character received at the event time. The selections are displayed in Figure 4.14-1. If NONE is selected, no trapping functions are enabled. The SYNC selection will provide trapping whenever a synchronization code is received. The PAR selection will provide trapping when a parity error is detected. FRM will provide trapping when a framing error is detected (ASync mode only).

For EIA control line selections (RTS, CTS, DSR, DTR, SQ, RI, and BUSY), another setting must be selected. See Figures 4.14-2 and 4.14-3. The LOW selection allows the EIA control line character to be trapped when the signal appears low (OFF). Likewise, the HIGH selection allows the EIA control line character to be trapped when the signal appears high (ON). A blinking character will be displayed whenever the event occurs. When trapping on an EIA control line selection, all characters received when the event is occurring will be blinking.

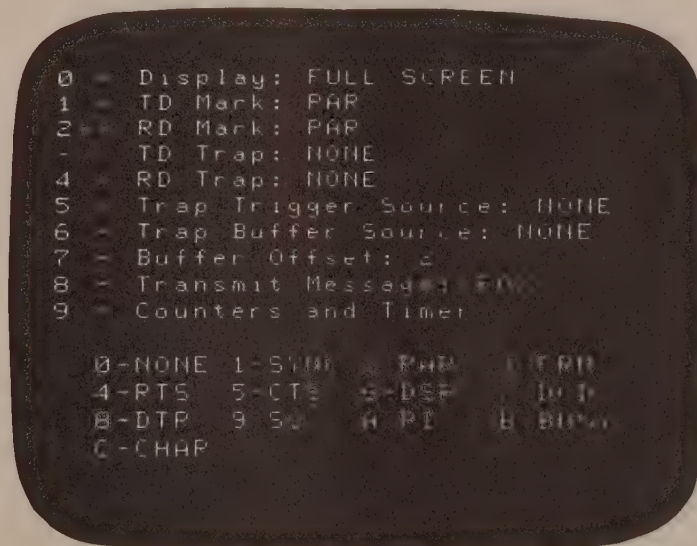
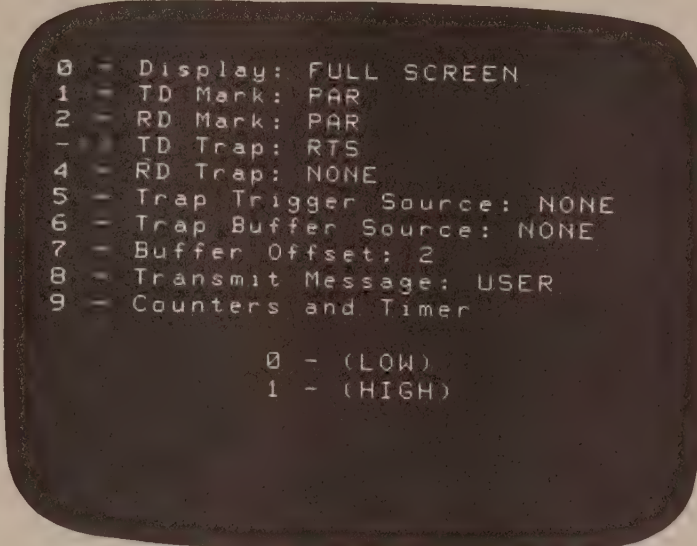


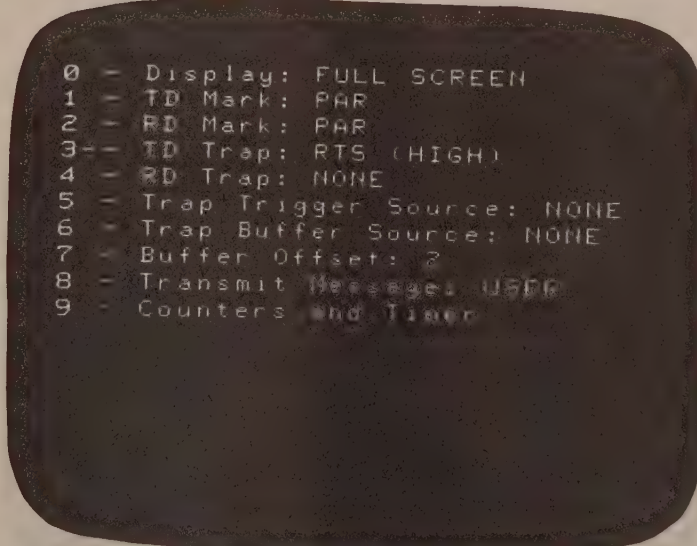
FIGURE 4.14-1. TD TRAP SELECTIONS



```
0 - Display: FULL SCREEN
1 - TD Mark: PAR
2 - RD Mark: PAR
- TD Trap: RTS
4 - RD Trap: NONE
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
8 - Transmit Message: USER
9 - Counters and Timer

0 - (LOW)
1 - (HIGH)
```

FIGURE 4.14-2. EIA CODE SUB-SELECTIONS



```
0 - Display: FULL SCREEN
1 - TD Mark: PAR
2 - RD Mark: PAR
3 - TD Trap: RTS (HIGH)
4 - RD Trap: NONE
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
8 - Transmit Message: USER
9 - Counters and Timer
```

FIGURE 4.14-3. EIA CODE ENTERED

4.14 TD Trap (continued)

The CHAR selection provides trapping on any character or character string (up to 127 characters long) entered by the operator. Pressing the CHAR selection displays two additional options (EXAMINE, ASSEMBLE) as shown in Figure 4.14-4. The EXAMINE option displays the previously programmed character string stored in non-volatile memory. See Figure 4.14-5. The ASSEMBLE option allows the operator to select a character string for trapping. Each character is entered via the hex keyboard as two hex digits. See Figure 4.14-6. "Don't Care" character locations are entered as hex character '00' and are not considered during a trapping sequence. These "Don't Care" characters should be entered on a one-to-one basis corresponding to the number of character locations that are not to be considered.

When a character string is selected for trapping and that string appears in the data stream, the last character of the received string will blink, thus indicating a match. Single characters are treated as one-character strings.

If a hex digit is incorrectly entered via the keyboard, the Delete/Hold Command Key can be pressed to erase the last digit entered. This occurs only if the first of the two Hex digits (digit inside cursor) has been entered. Otherwise, deletion will be on a character basis.

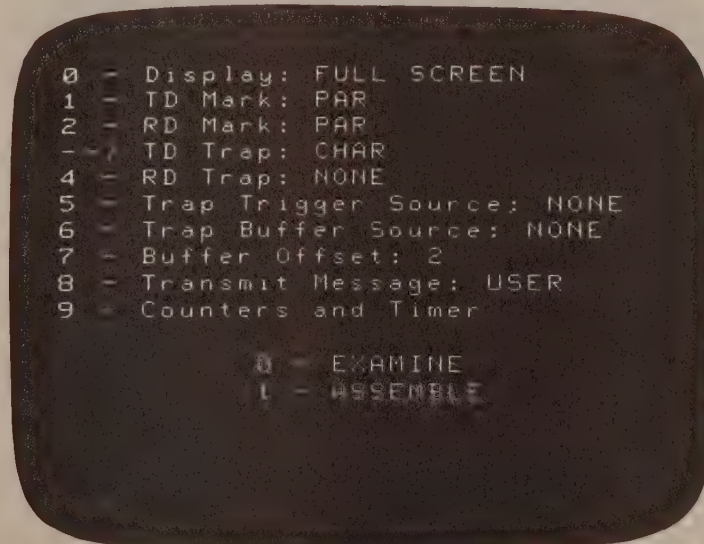


FIGURE 4.14-4. CHAR SUB-SELECTIONS

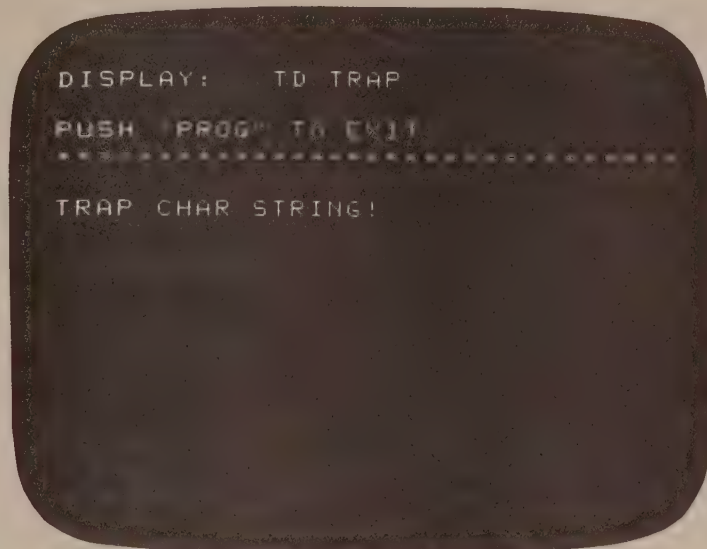


FIGURE 4.14-5. EXAMINE CHAR STRING

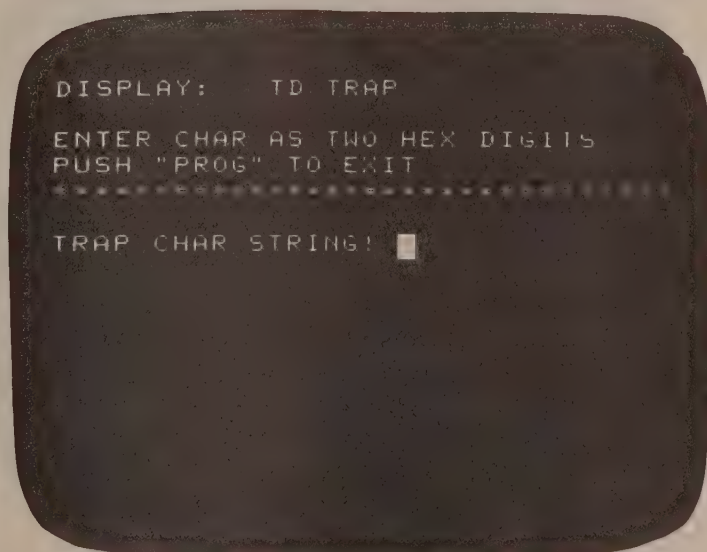


FIGURE 4.14-6. ASSEMBLE CHAR STRING

4.15 RD Trap

This switch allows the operator to set the conditions for trapping. The presence of a trap event on the RD side will be displayed by a blinking character received at the event time. The selections are displayed in Figure 4.15. These selections are the same as for TD Trap. For a description of each selection, see Section 4.14, TD Trap.

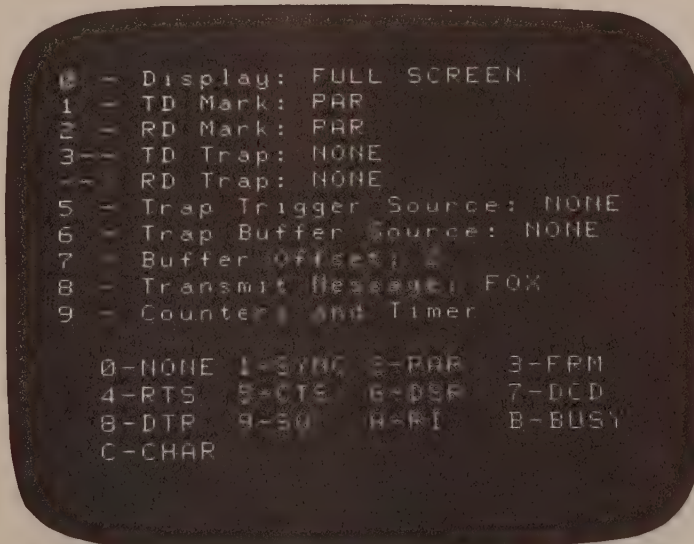


FIGURE 4.15. RD TRAP SELECTIONS

4.16 Trap Trigger Source

This switch allows the operator to initiate the trapping of data. The selections are displayed in Figure 4.16. The NONE selection disables the trapping of data. The TD selection initiates trapping on a TD event only. The RD selection initiates trapping on a RD event only. The TD/RD selection initiates trapping on either a TD or RD event.

When the Line Protocol switch is programmed for asynchronous operation, trap triggering is disabled until data being monitored is in Frame; regardless of the presence of a blinking trap character. The synchronization will occur within 128 clock periods.

When the Line Protocol switch is programmed for synchronous operation, trap triggering is disabled until two sync characters are received.

NOTE: Even though a selection has been made for TD Trap and RD Trap, trapping is disabled until the trap trigger has been qualified.

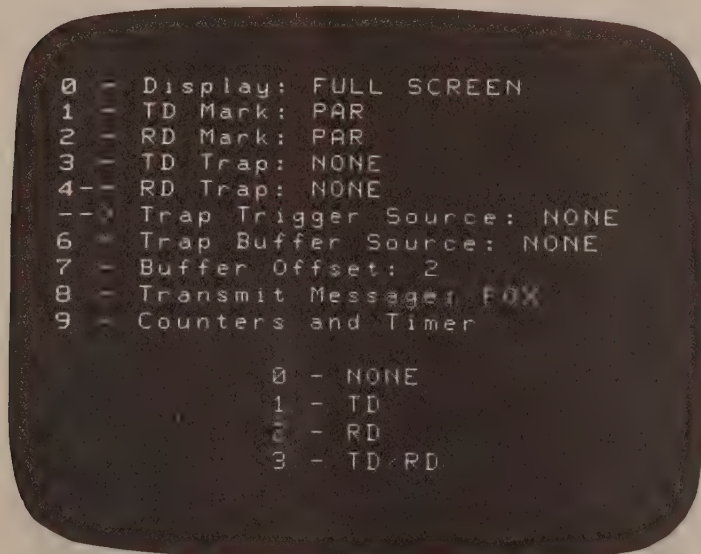


FIGURE 4.16. TRAP TRIGGER SOURCE SELECTIONS

4.17 Trap Buffer Source

This switch allows the operator to determine which data will be stored in the buffer after trapping is initialized. The selections are displayed in Figure 4.17. If NONE is selected, no data is stored in the buffer after the trap event. The TD selection allows only TD characters to be stored after the trap event. The RD selection allows only RD characters to be stored in the buffer after the trap event. The TD/RD selection allows both TD and RD characters to be stored after the trap event.

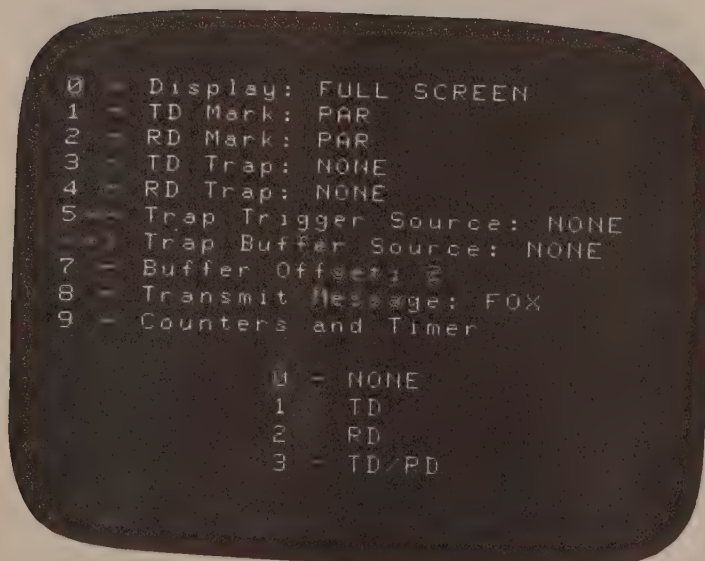


FIGURE 4.17. TRAP BUFFER SOURCE SELECTIONS

4.18 Buffer Offset

This switch allows the operator to select the position of the trap character within the 4096-character buffer storage and positions the first trapped event in the buffer. The selections are displayed in Figure 4.18. The operator selects the configuration of the buffer as follows:

- 0 - Positions trap character in the buffer followed by 4095 trapped characters.
- 1 - Positions trap character in the buffer with 1024 characters preceding it and 3071 characters following it.
- 2 - Positions trap character in the buffer with 2048 characters preceding it and 2047 characters following it.
- 3 - Positions trap character in the buffer with 3072 characters preceding it and 1023 characters following it.
- 4 - Positions trap character at the end of the buffer preceded by 4095 characters.

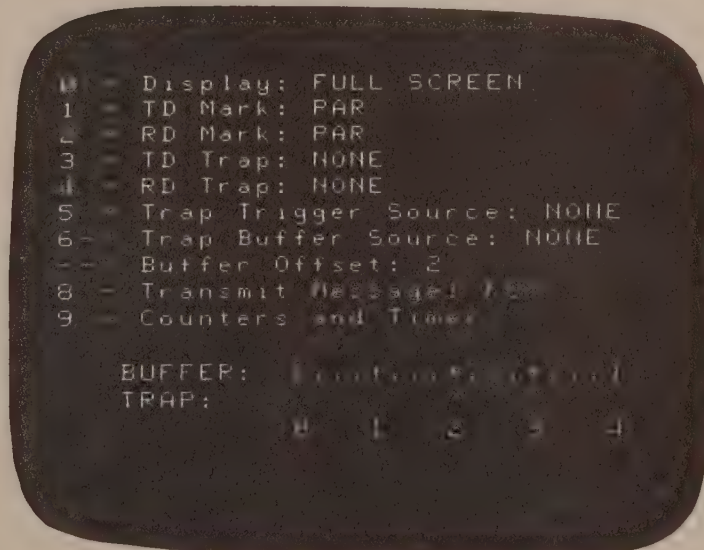


FIGURE 4.18. BUFFER OFFSET SELECTIONS

4.19 Transmit Message

This switch allows the operator to determine the contents of the transmit buffer. The selections are displayed in Figure 4.19-1. The FOX selection loads the "Fox" message (THE QUICK BROWN FOX JUMPS OVER A LAZY DOG 0123456789 CR LF) into the transmit buffer. The CHAR SET selection loads the entire character set, based on the number of code bits selected, into the transmit buffer. The code level must be selected first; see Section 4.6, Code Level.

Pressing the USER selection displays two additional options (EXAMINE, ASSEMBLE) as shown in Figure 4.19-2. The EXAMINE option allows the FOX, CHAR SET, or USER message to be selected and displayed on the CRT as shown in Figures 4.19-3, 4.19-4, and 4.19-5, respectively. The ASSEMBLE option allows entry of any message (up to 256 characters), of the operator's own design, into the transmit buffer.

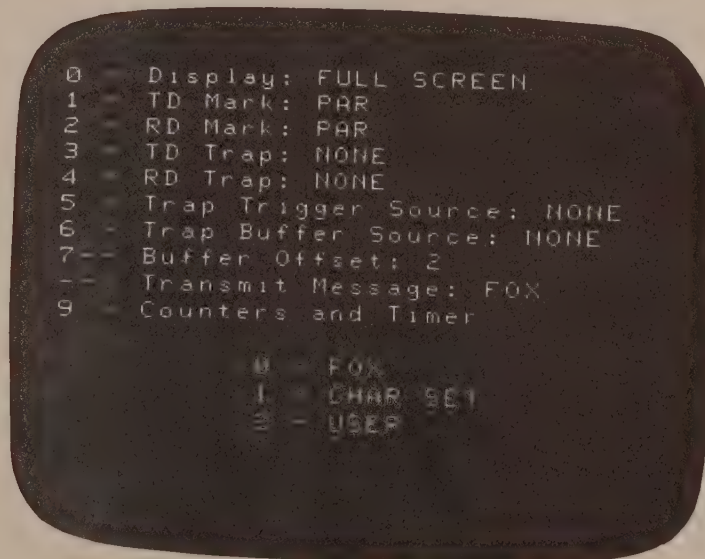


FIGURE 4.19-1. TRANSMIT MESSAGE SELECTIONS


```

0 - Display: FULL SCREEN
1 - TD Mark: PAR
2 - RD Mark: PAR
3 - TD Trap: NONE
4 - RD Trap: NONE
5 - Trap Trigger Source: NONE
6 - Trap Buffer Source: NONE
7 - Buffer Offset: 2
-- Transmit Message: USER
9 - Counters and Timer

```

```

0 - EXAMINE
1 - ASSEMBLE

```

FIGURE 4.19-2. USER SUB-SELECTIONS

DISPLAY: XMIT MSG

PUSH "PROG" TO EXIT

```

0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF
02636465666768696A6B6C6D6E6F6A6B6C6D6E6F6A6B6C6D6E6F6A6B6C6D6E6F
03 abcdefghijklmnopqrstuvwxyz0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ
04 ABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ
05 STUVWXYZABCDEFGHIJKLmnopqrstuvwxyz0123456789ABCDEFGHIJKLmnop

```

FIGURE 4.19-4. EXAMINE CHAR SET (EBCDIC)

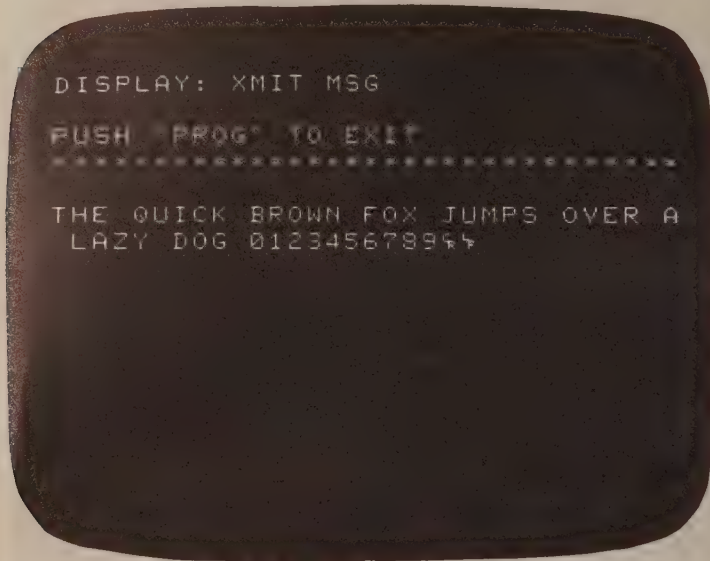


FIGURE 4.19-3. EXAMINE FOX MESSAGE

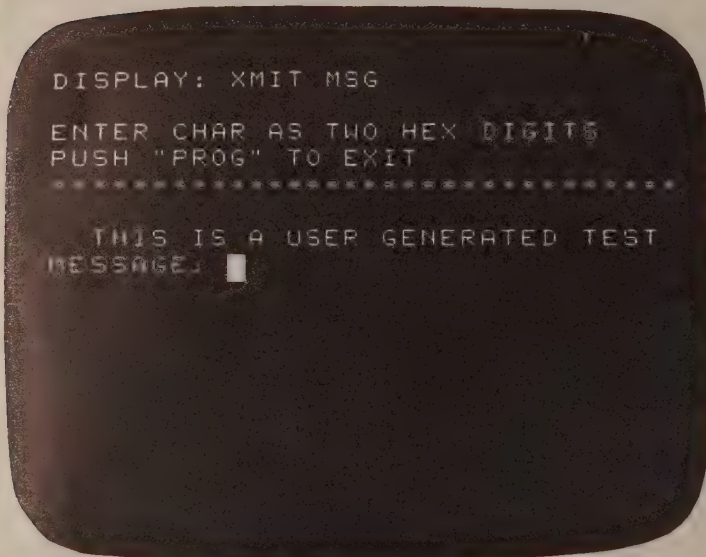


FIGURE 4.19-5. ASSEMBLE OR EXAMINE USER MESSAGE

4.20 Counters and Timer

This switch allows the operator to reset the contents of the four event counters and to reconfigure and reset the millisecond timer. See Figure 4.20-1. Each of the counters can accumulate up to 999 occurrences of the programmed selections, with a negative overrange indication. As a reminder, the programmed selections for each counter is displayed in brackets. Each counter can be individually reset by pressing the corresponding key on the hex keyboard.

The Timer measures the time, from 0.1 msec to 999.9999 seconds, between two programmed events. The selections are shown in Figure 4.20-2. The selections configure the Timer to start and stop counting on a TD or RD trap event as follows:

- 0 - Start counting on a RD event and stop on a RD event.
- 1 - Start counting on a TD event and stop on a RD event.
- 2 - Start counting on a RD event and stop on a TD event.
- 3 - Start counting on a TD event and stop on a TD event.

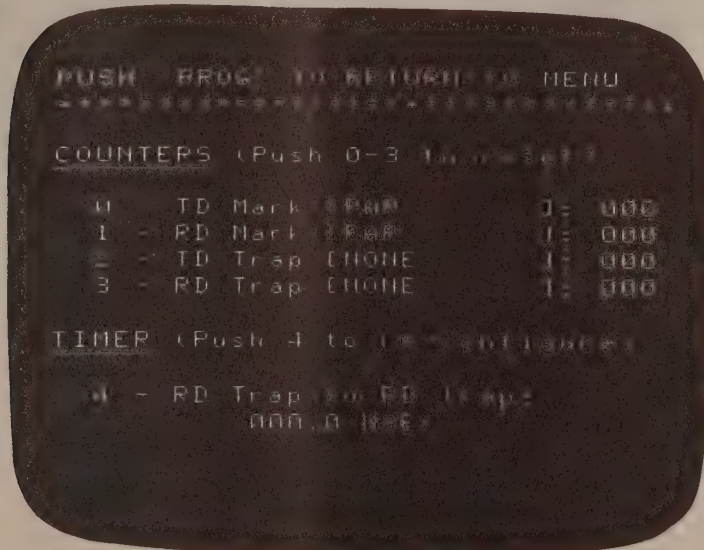


FIGURE 4.20-1. COUNTER AND TIMER SELECTIONS

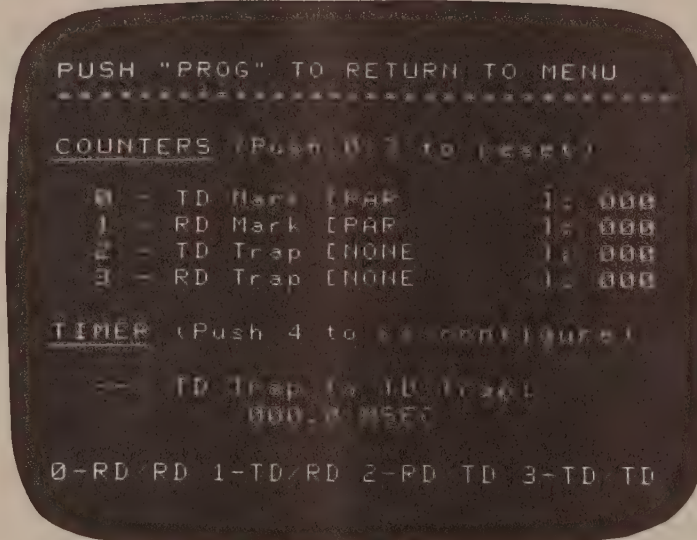


FIGURE 4.20-2. TIMER SUB-SELECTIONS

5.0 OPERATION

The twenty-key keyboard command system controls all functions of the Hawk 4000. The 16-key hexadecimal keyboard, labeled 1-9, A-F, is used for data entry during programming and system control during operation. Fourteen of the sixteen keys are used for special functions and have corresponding color coded legends in addition to the Hex legend printed on the key. The color of the legend on the special function keys corresponds to the color of one of the four command keys.

The four command keys are labeled:

PROG (Program), REPLAY, MON (Monitor), DELETE/HOLD

NOTE: Each of the command keys is lighted when the Hawk 4000 is operating in that respective mode.

PROGRAM key lighted - all sixteen keys of the Hex keyboard are enabled for data entry of the "control switch" selections (as described in Section 4.0, Programming the Hawk 4000). Having programmed all "control switches" to the operator's desired settings, the Hawk 4000 is ready for operation.

REPLAY key lighted - the yellow legend special function keys are enabled for system control. In this mode, data is recalled from the 4096 character buffer and displayed on the CRT for visual analysis. No new data is stored in the 4096-character buffer when the REPLAY key is lighted. Stored data can be scanned forward or reverse, with three scanning speeds in both directions under the control of the following yellow legend keys:

<u>Key</u>	<u>Legend</u>	<u>Special Function</u>
0	STOP	Stop the display.
1	1st	Display to move at approximately 10 cps.
2	2nd	Display to move at approximately 20 cps.
3	3rd	Display to move at approximately 30 cps.
4	←	Display to move in the reverse direction
7	→	Display to move in the forward direction
9	OCTAL	Changes the code from the programmed selection to Octal and back again.
C	TR CH	Locate the trap character that triggered the trapping of data and freeze the display.
D	HEX	Changes the code from the programmed selection to Hex and back again.

5.0 OPERATION (continued)

In addition to placing the Hawk 4000 in the Replay mode by pressing the REPLAY key, the Hawk 4000 will automatically go to this mode when trapping is triggered by a selectable event and the buffer is filled with data. (Refer to Sections 4.14, TD Trap and 4.15, RD Trap.)

MONITOR key lighted - the green legend special function keys are enabled to transmit the contents of the transmit buffer. Data is transmitted from the buffer under control of the following green legend keys:

<u>Key</u>	<u>Legend</u>	<u>Special Function</u>
5	REPLY	Transmits the Xmit message once after every trap event.
6	POLL	Simulates a host computer in a polling network: transmits sub-messages in a polling sequence.
A	XMIT 1	Single transmission of Xmit message.
E	XMIT ∞	Continuously transmits Xmit message.

MONITOR key lighted - the green legend special function keys are enabled to transmit the contents of the transmit buffer only in the modem-terminal or interactive mode. In the system mode, the Hawk 4000 may be used to monitor and display data appearing at the modem-terminal interface; data transmitted and received by the Hawk 4000 may also be monitored and displayed (see Section 4.1, System Mode). Operation of the Datatrap in the monitor and interactive (terminal/modem) modes will be discussed separately in Section 5.1, Monitor Operation and 5.2, Interactive Operation, respectively.

DELETE/HOLD key lighted - the DELETE/HOLD key is always lighted when the system is in the Program or Replay mode. In the System mode, the HOLD key has a toggling action. Pressing the HOLD key while monitoring data will freeze the data being displayed on the CRT and the contents of the buffer. Pressing the Hold key again will release the display and buffer to receive new data. No new data is stored in the buffer when the HOLD key is lighted.

EDITING is enabled when in the Program mode: use of the DELETE/HOLD key allows the user to delete the last character entered into the user message, or into the trap character strings. A character is deleted each time the DELETE/HOLD button is pushed.

5.0 OPERATION (continued)

The lighted HOLD key enables the red legend special function key, labeled PRINT, to activate the Hawk 4000's printing circuitry.

5.1 Monitoring Operation

When the System Mode is selected as Monitor, the Hawk 4000 can only monitor and display on-line data appearing at the modem-terminal interface. In this mode, the green legend keys are disabled and the system has no transmit capability.

The Hawk 4000 can be connected to the modem-terminal interface by the front panel MONITOR IN connector or can be connected in series with the data link using the rear panel connectors labeled To DCE and To DTE for passive operation.

5.2 Interactive Operation

When the System Mode is selected as Terminal or Modem, the green legend keys are enabled. This allows the Hawk 4000 to interactively communicate with either a modem or terminal by monitoring and displaying data transmitted and received by the Hawk 4000. A test message is selected, as described in Section 4.19, Transmit Message, and can be transmitted to either a modem or terminal when one of the green legend keys is pressed. The four special function keys that are enabled during Modem/Terminal (Interactive) operation, operate as shown below:

<u>Key</u>	<u>Legend</u>	<u>Special Function</u>
5	REPLY	Transmits the Xmit message once after every trap event.
6	POLL	Simulates a host computer in a polling network: transmits sub-messages in a polling sequence.
A	XMIT 1	Single transmission of Xmit message.
E	XMIT ∞	Continuously transmits Xmit message.

When the Line Protocol switch is programmed for synchronous operation and the System Mode programmed to the Modem selection, the operator must select a data rate other than EXT. In this case, the Hawk 4000 acts like a synchronous modem and must provide its own clock for system timing purposes.

When the System Mode selection is programmed to Terminal, the operator must select a data rate other than EXT. The Hawk

5.2 Interactive Operation (continued)

4000 acts like an externally synchronous terminal and must provide external timing for system timing purposes.

For interactive (Modem/Terminal) operation, the Hawk 4000 must be connected in series with the modem and terminal using the rear panel connectors.

NOTE: The Hawk 4000 can only interact with either a modem or terminal at any one time, even though both may remain connected.

XMIT 1 and XMIT ∞ - Before the Hawk 4000 will transmit a test message singly or continuously, certain signal conditions must be established. If these signal conditions are not properly satisfied, the Hawk 4000 will not respond to use of the XMIT 1 or XMIT keys. These signal conditions depend upon whether the Hawk is involved in half-duplex or full-duplex message transmission or is used as a modem or a terminal. The conditions are given in the table below. An "X" signifies that in full-duplex operation, DCD and RTS are unnecessary:

	<u>Half-Duplex</u>	<u>Full-Duplex</u>
Hawk 4000 used to simulate a terminal	CTS (pin 5)-High DCD (pin 8)-Low	CTS - High X
Hawk 4000 used to simulate a modem	RTS (pin 4)-Low	X

When the Hawk 4000 is being used to simulate a modem, it must sense the rising edge of Request to Send (RTS) before it will raise Clear to Send (CTS). The delay between the rising edge of RTS and when CTS is raised varies as a function of both the data rate and whether the Hawk 4000 is simulating a half or full-duplex modem. The RTS/CTS delays are shown in the chart below:

	<u>RTS/CTS DELAYS</u>	
Data Rate	Half-Duplex (ms)	Full-Duplex (ms)
EXT	222-252	222-252
75	222-252	111-126
110	"	"
134.5	"	"
150	"	"
300	"	"
600	"	"
1200	111-126	7.1-8
1800	"	"

5.2 Interactive Operation (continued)

Data Rate	Half-Duplex (ms)	Full-Duplex (ms)
2000	111-126	7.1-8
2400	"	"
3600	"	56-62
4800	"	"
7200	222-252	222-252
9600	"	"
19200	"	"

REPLY - In this mode the Hawk 4000 will transmit the Xmit message once after every trap event. As the REPLY function is dependent upon a trap event for operation, the Hawk 4000 will not reply (transmit the test message) unless a trap event, such as a character string, has been selected. If a trap event is not entered into the Hawk 4000, the Hawk 4000 will be unable to operate in the REPLY mode.

In the REPLY mode, the Hawk 4000 may be used to simulate a remote terminal or a central site modem. Used as a remote terminal, the Hawk 4000 may be used to reply to the remote modem. Both the remote modem and the Hawk 4000 (which is simulating a remote terminal) are detached from the telephone line for the purpose of testing operations.

When used as a central site modem to test a host computer, the Hawk 4000 (simulating the modem) and the host computer are taken off the telephone line. Thus, the Hawk 4000 is used in the REPLY configuration to reply to a remote terminal which may be suspected of replying to addresses other than its own. In this case, the Xmit message is used to simulate polling addresses.

Similarly, the Hawk 4000 may be used to reply (after a trap event) to a host computer because of a number of suspected malfunctions in the computer. In this configuration, the Hawk 4000 and the host computer are taken off the telephone line for testing purposes.

POLL - In this mode the Hawk 4000 will simulate a host computer in a polling network. The user will load into the Xmit message the polling sequence that he wishes to send to a remote terminal (when the Hawk 4000 is simulating a remote modem), or a remote terminal (when the Hawk 4000 is simulating a host computer in a polling network).

5.2 Interactive Operation (continued)

The polling sequence message will be made up of a number of sub-messages. Each sub-message will address a unique terminal and will end with a unique character. This unique or delimiter character is used to indicate the end of each sub-message. After the Hawk 4000 sends each sub-message, it will cease transmission and wait for a reply or will wait for three (3) seconds before sending the next sub-message. The Hawk 4000 will respond with a subsequent sub-message transmission upon detecting the falling edge of DCD (Data Carrier Detect) when simulating a terminal. Note: Should DCD not fall (or go low) the Hawk 4000 will not transmit the next sub-message and will idle, indicating that a modem is streaming and will not relinquish the data transmission line.

When the Hawk 4000 is simulating a modem in the POLL mode, it will send a subsequent sub-message on detecting RTS (Ready to Send) going low. If RTS is already low, the Hawk 4000 will transmit a subsequent sub-message after a delay of 1.5 seconds. Should RTS remain high, the Hawk 4000 will not send subsequent sub-messages.

NOTE: The sub-message delimiter character must be entered as a Mark, or the Hawk 4000 will not perform polling functions.

Delimiter characters are used as unique characters to indicate the end of each sub-message in a polling address sequence.

NOTE: The delimiter character is entered into the Hawk 4000's program as a TD Mark when the Hawk 4000 is simulating a terminal.

NOTE: The delimiter character is entered into the Hawk 4000's program as a RD Mark when the Hawk 4000 is simulating a modem.

Transmit data is from user buffer. Receive data is from Model 1310 Range Rider (below).

```
;A5;5-;* )Onkg%^.Ra$tm,B5~l^555  
Hr5555*b1+G79@999*C=Y55 jr79m0,55  
5Xt/4\8sq;A5;5-;* )Onkg%^.Ra$tm  
B5~l^555Hr5555*b1+G79@999*C=Y55  
jr79m0,555Xt/4\8sq;A5;5-;* )Onk  
g%^.Ra$tm,B5~l
```



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Transmit data is from user buf-

fer. Receive data is from Model

1310 Range Rider (below).

```
      E      S      D F      S B SGD
iA5iX=-*_10oHsZC1aStm18I%LCIS3

      SRUE      FD DA      DL      D      EE
HrYSSC*b1tGE1@LK9*C=Y3EjrZ2mD.MX

      F      E      S      D F
ESXt/4\&sqiA5iX=-*_10oHsZC1aStm

      S B SGD      SRUE      FD DA      DL
18I%LCIS3HrYSSC*b1tGE1@LK9*C=Y3E

      D      EE      E      S
jrZ2mD.MXESXt/4\&sqiA5iX=-*_10oH

      D F      S B
sZC1aStm18I%
```

FIGURE 5.3.

CRT DISPLAY AND PRINTOUT

6.0 OPTIONS

6.1 Rack Mount

A rack mount adaptor is available for mounting the Hawk 4000 in a 19" wide cabinet. The rack mount adaptor consists of two 3/4 inch wide ears mounted on the side panels of the unit. A photograph of the Hawk 4000 with the rack mount option installed is shown in Figure 6.1. For installation instructions, see Section 2.5, Installing Rack Mount option.

6.2 230 VAC Operation

A factory modification is required for 230 VAC, 50 Hz operation.

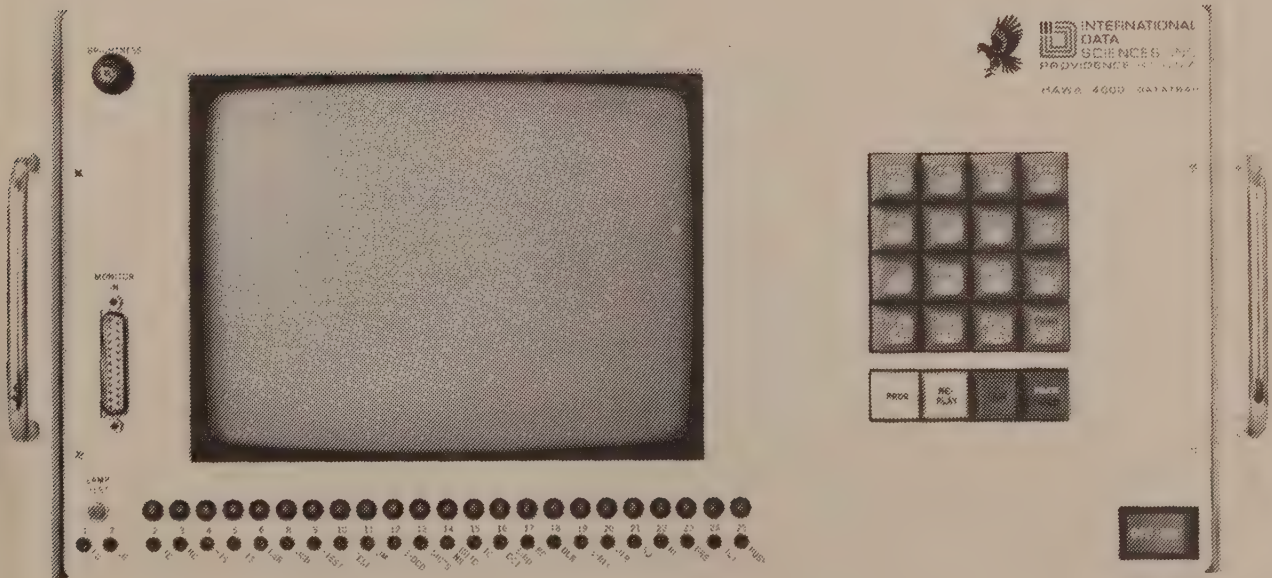


FIGURE 6.1. RACK MOUNT OPTION

APPENDIX

ASCII CODE CHART

b7 →					0	0	0	0	1	1	1	1
b6 →					0	0	1	1	0	0	1	1
b5 →					0	1	0	1	0	1	0	1
1 st HEX DIGIT →					0	1	2	3	4	5	6	7
2 nd HEX DIGIT												
b4	b3	b2	b1									
0	0	0	0	0	N _U	D _L	␣	@	P	␣	p	
0	0	0	1	1	S _H	D ₁	!	1	A	Q	a	q
0	0	1	0	2	S _X	D ₂		2	B	R	b	r
0	0	1	1	3	E _X	D ₃	#	3	C	S	c	s
0	1	0	0	4	E _T	D ₄	\$	4	D	T	d	t
0	1	0	1	5	E _Q	N _K	%	5	E	U	e	u
0	1	1	0	6	A _K	S _Y	&	6	F	V	f	v
0	1	1	1	7	B _L	E _B	'	7	G	W	g	w
1	0	0	0	8	B _S	C _N	(	8	H	X	h	x
1	0	0	1	9	H _T	E _M	)	9	I	Y	i	y
1	0	1	0	A	L _F	S _B	*	:	J	Z	j	z
1	0	1	1	B	V _T	E _C	+	;	K	[	k	{
1	1	0	0	C	F _F	F _S	,	<	L	\	l	!
1	1	0	1	D	C _R	G _S	-	=	M	]	m	}
1	1	1	0	E	S _O	R _S	.	>	N	^	n	~
1	1	1	1	F	S _I	U _S	/	?	O	_	o	

b7 → b6 → b5 →				upper case															
1st HEX DIGIT				0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
2nd HEX DIGIT																			
b4	b3	b2	b1																
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	0	1	1	1	0	0	0	1	0	1	1	1
0	0	1	0	0	0	1	0	1	0	1	1	0	0	1	0	1	0	1	1
0	0	1	1	0	0	1	1	0	1	1	1	0	0	1	1	0	1	1	1
0	1	0	0	0	1	0	0	1	0	1	1	0	1	0	0	1	0	1	1
0	1	0	1	0	1	0	1	0	1	1	1	0	1	0	1	0	1	1	1
0	1	1	0	0	1	1	0	0	1	1	1	0	1	1	0	0	1	1	1
0	1	1	1	0	1	1	1	0	0	1	1	0	1	1	1	0	0	1	1
1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
1	0	0	1	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0
1	0	1	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0
1	0	1	1	1	0	1	1	0	0	0	0	1	0	1	1	0	0	0	0
1	1	0	0	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0
1	1	0	1	1	1	0	1	0	0	0	0	1	1	0	1	0	0	0	0
1	1	1	0	1	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0
1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0

UNIVAC FIELD DATA AFTER 1-8 REVERSAL

0 0 b6 b5 → → → →					0	0	0	0
					0	0	0	0
					0	0	1	1
					0	1	0	1
1st HEX DIGIT					0	1	2	3
2nd HEX DIGIT								
b4	b3	b2	b1					
0	0	0	0	0	@	]	[	#
0	0	0	1	1	)	+	-	<
0	0	1	0	2	K	M	L	N
0	0	1	1	3	~~8~~	2	1	3
0	1	0	0	4	C	E	D	F
0	1	0	1	5	*	%	(	:
0	1	1	0	6	S	U	T	V
0	1	1	1	7	8	'	9	;
1	0	0	0	8	^	A	space	B
1	0	0	1	9	=	&	>	\$
1	0	1	0	A	O	Q	P	R
1	0	1	1	B	4	6	5	7
1	1	0	0	C	G	I	H	J
1	1	0	1	D	?	,	!	/
1	1	1	0	E	W	Y	X	Z
1	1	1	1	F	/		•	!

BAUDOT TYPE A

b7 → b6 → b5 →					0	0	0	0
					0	0	0	0
					0	1	0	1
1st HEX DIGIT					0	1	2	3
2nd HEX DIGIT					-			
b4	b3	b2	b1					
0	0	0	0	0	space	E	space	3
0	0	0	1	1	T	Z	5	"
0	0	1	0	2	C _R	D	C _R	S _Y
0	0	1	1	3	O	B	9	\$
0	1	0	0	4		S		?
0	1	0	1	5	H	Y	#	B _L
0	1	1	0	6	N	F	9	6
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REPAIR SERVICE

All units sold by International Data Sciences, Inc. are calibrated at the time of delivery. If the unit requires repairs that are not covered by the original warranty, then IDS will perform the repair at an hourly charge plus parts. Normal turn-around time for repair is six weeks.

All Units returned to IDS for repair will be accepted only if transportation charges are prepaid. The purchaser is also responsible for all transportation charges incurred in returning the calibrated unit to the purchaser.

For fast service Federal or Emery Air Freight are recommended. If time is not a problem, UPS is recommended. Return address should be clearly stated and should include a person to the attention of whom unit will be shipped.

Shipping cartons with proper foam packing are available from IDS. The carton will facilitate shipping the equipment to be repaired with a maximum of protection.

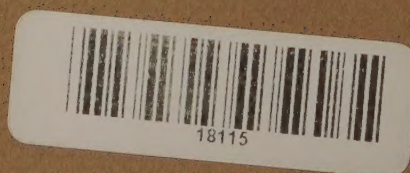
WARRANTY

All International Data Sciences, Inc. instruments are warranted against defects in material, workmanship and component failures for a period of ninety days and against defects in material and workmanship for a period of one year. All Units returned to IDS under this warranty require prepaid transportation charges. The purchaser is also responsible for all transportation charges incurred in returning the repaired unit to the purchaser.

Instruments to be returned under this Warranty require prior authorization by an International Data Sciences, Inc. representative or by the service manager of International Data Sciences, Inc.

International Data Sciences, Inc. reserves the right to make changes in design at any time without incurring any obligation to install same on units previously purchased.

This Warranty is expressly in lieu of all other obligations or liabilities on the part of International Data Sciences, Inc., and International Data Sciences, Inc. neither assumes nor authorizes any person to assume for them any other liability in connection with the sales of International Data Sciences, Inc. instruments.



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